FIG. 1

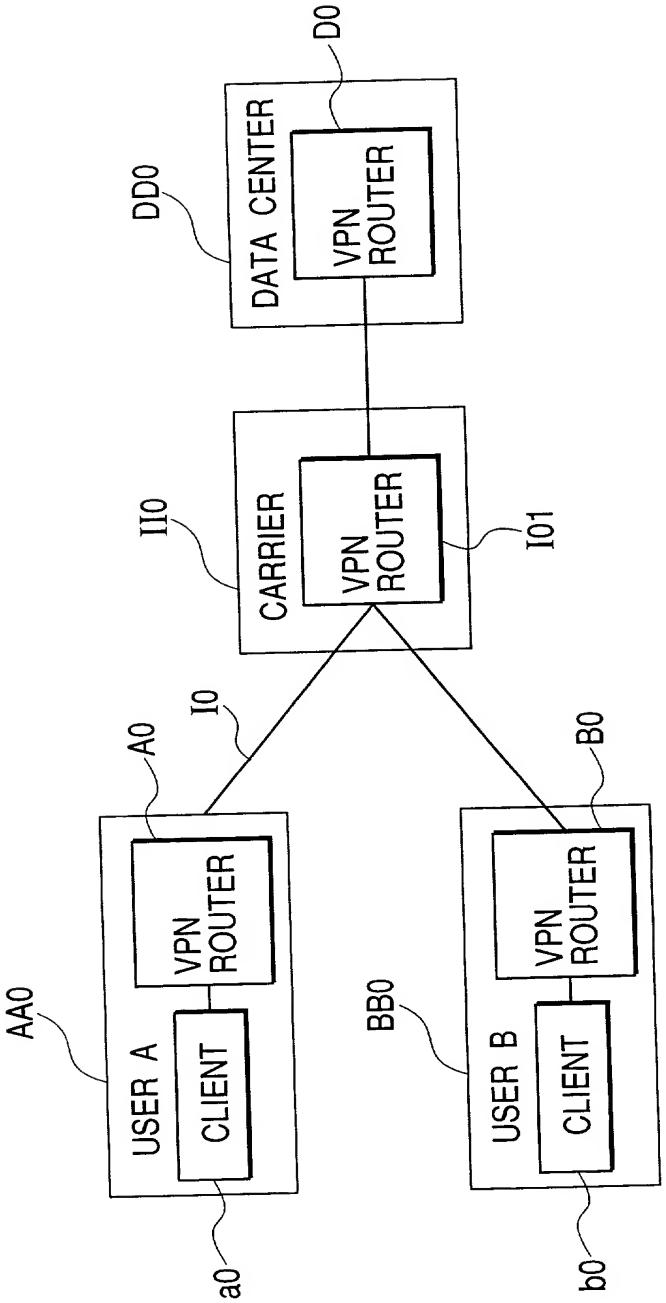

DD0
DATA CENTER
D0
VPN ROUTER
II0
CARRIER
VPN ROUTER
I01
I0
A0
B0
AA0
USER A
CLIENT
VPN ROUTER
BB0
USER B
CLIENT
VPN ROUTER
a0
b0

FIG. 2

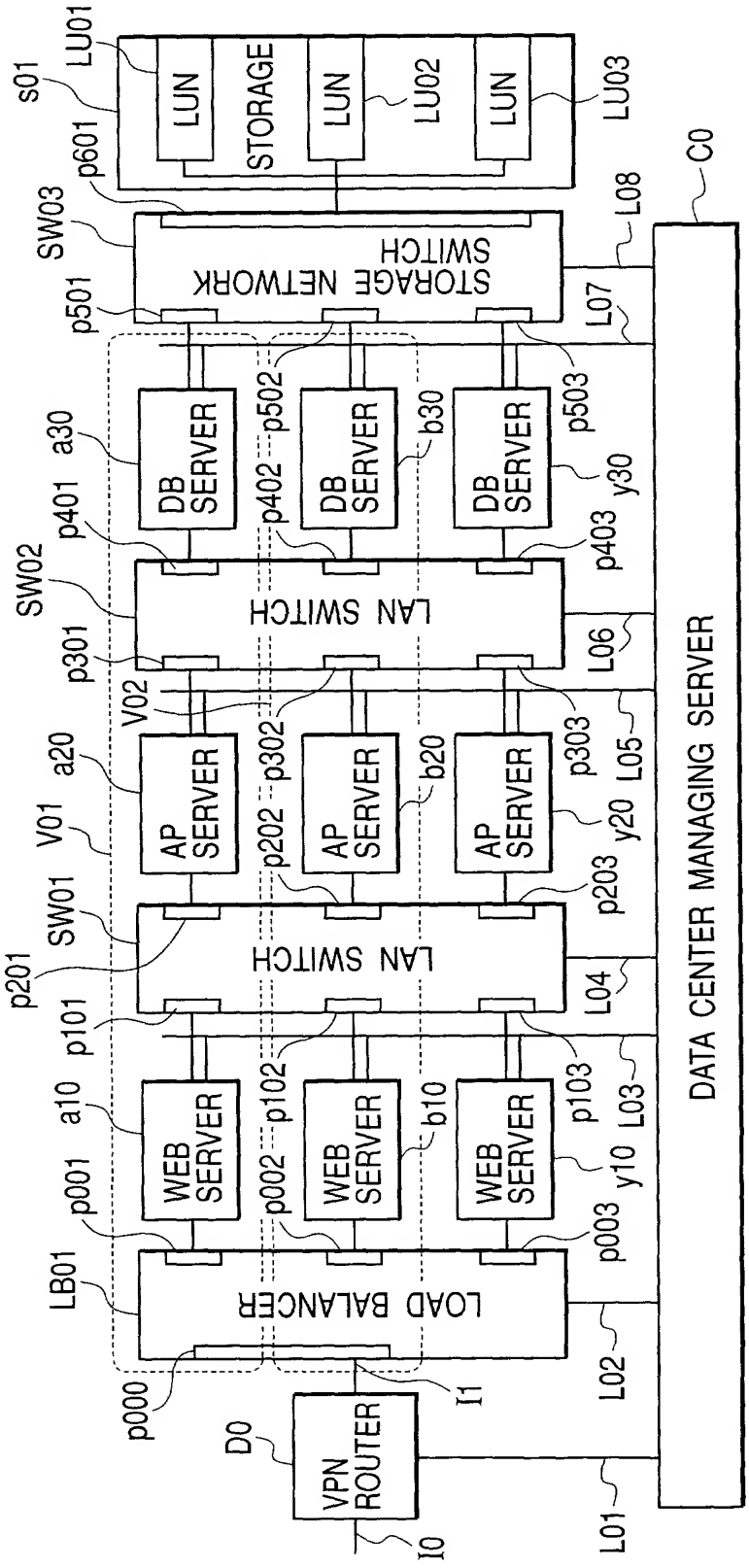

DATA CENTER MANAGING SERVER
C0
VPN ROUTER
D0
I0
I1
LOAD BALANCER
LB01
WEB SERVER
AP SERVER
DB SERVER
LAN SWITCH
STORAGE NETWORK SWITCH
STORAGE
LUN
LU01
LU02
LU03
s01
SW01
SW02
SW03
V01
V02
a10
a20
a30
b10
b20
b30
y10
y20
y30
p000
p001
p002
p003
p101
p102
p103
p201
p202
p203
p301
p302
p303
p401
p402
p403
p501
p502
p503
p601
L01
L02
L03
L04
L05
L06
L07
L08

FIG. 3

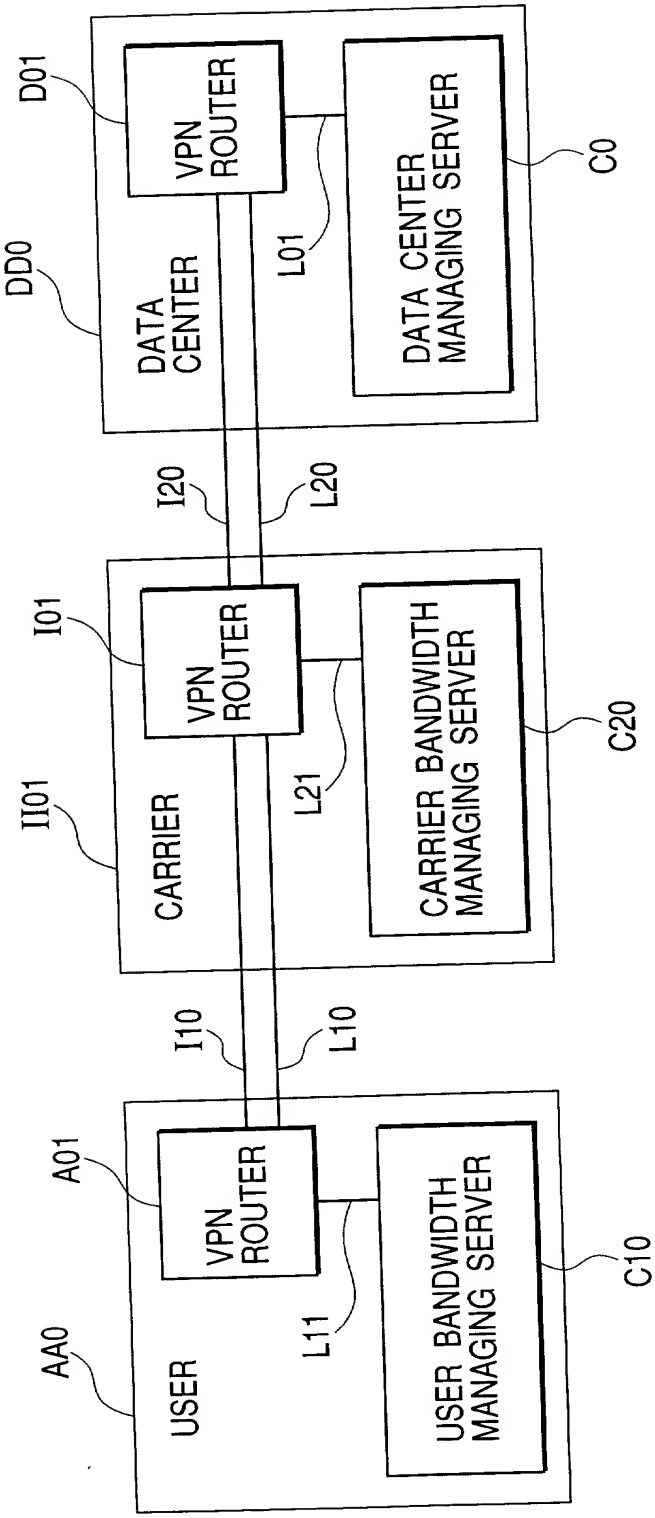

USER
AA0
A01
VPN ROUTER
L11
USER BANDWIDTH MANAGING SERVER
C10
I10
L10
CARRIER
II01
I01
VPN ROUTER
L21
CARRIER BANDWIDTH MANAGING SERVER
C20
I20
L20
DATA CENTER
DD0
D01
VPN ROUTER
L01
DATA CENTER MANAGING SERVER
C0

FIG. 4

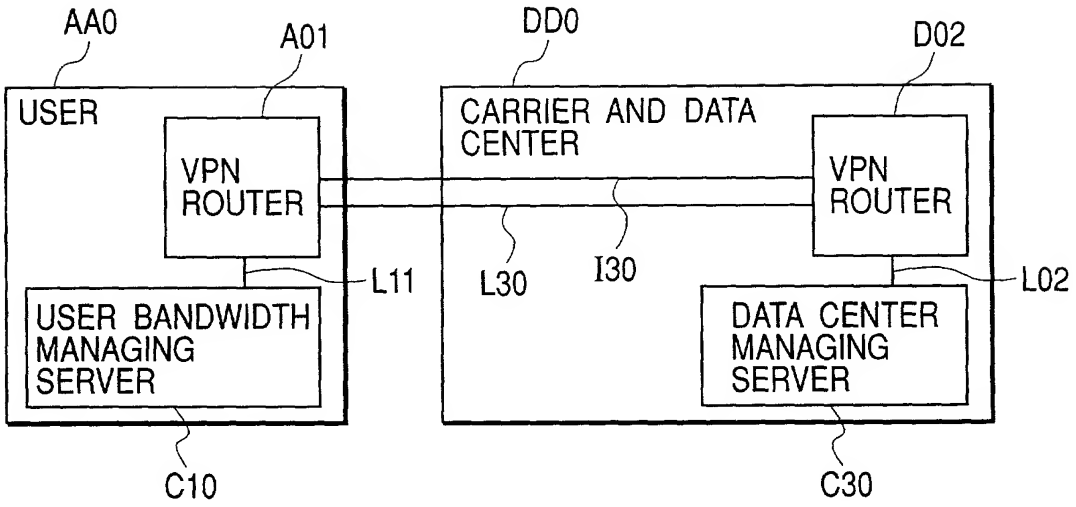

AA0
A01
DD0
D02
USER
VPN ROUTER
CARRIER AND DATA CENTER
VPN ROUTER
L11
L30
I30
L02
USER BANDWIDTH MANAGING SERVER
DATA CENTER MANAGING SERVER
C10
C30

FIG. 5

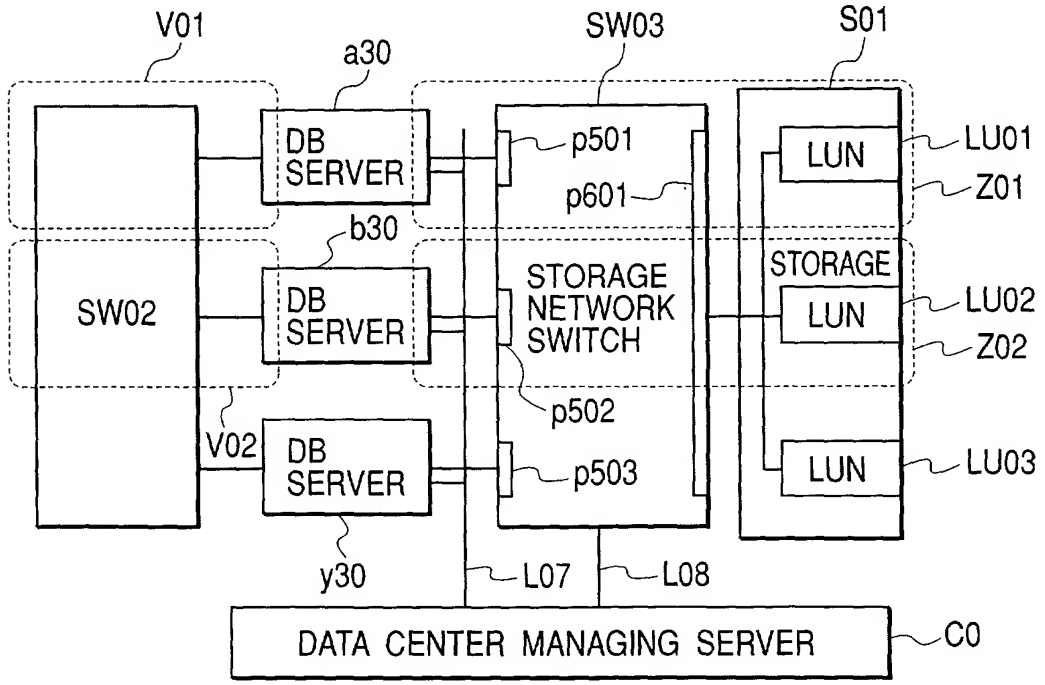

V01
a30
SW03
S01
DB SERVER
p501
LUN
LU01
p601
Z01
b30
SW02
DB SERVER
STORAGE NETWORK SWITCH
STORAGE
LUN
LU02
Z02
p502
V02
DB SERVER
p503
LUN
LU03
y30
L07
L08
DATA CENTER MANAGING SERVER
C0

FIG. 6

LOAD BALANCER ADDRESS CORRESPONDENCE TABLE

T00

UID	VIRTUAL addr	REAL addr
#0	a100	a10
#1	b100	b10

VLAN STRUCTURE TABLE

T02

UID	VLAN#	WEB SERVER	AP SERVER	DB SERVER	PORT#(LB01)	PORT#(SW01)	PORT#(SW02)	SECURITY SERVICE
#0	0	a10	a20	a30	p000, p001	p101, p201	p301, p401	○
#1	1	b10	b20	b30	p000, p002	p102, p202	p302, p402	○

USER CONDITION SETTING TABLE

T01

UID	SERVER TYPE	VLAN-RELATED				VPN-RELATED				STORAGE NETWORK-RELATED			
		CPU UTILIZATION	LOWER LIMIT OF NUMBER OF UNITS	UPPER LIMIT OF NUMBER OF UNITS	SECURITY SERVICE	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	GUARANTEE BANDWIDTH	LUN ACCESS PRIORITY	NETWORK MINIMUM BANDWIDTH	NETWORK MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION
#0	WEB SERVER	BELOW 50%	ONE	SIX	○	1.5Mbps	5Mbps	40%	1.5Mbps	1	1.5Mbps	5Mbps	40%
	AP SERVER	BELOW 50%	ONE	SIX									
	DB SERVER	BELOW 50%	ONE	SIX									
#1	WEB SERVER	BELOW 50%	ONE	SIX	○	1.5Mbps	3Mbps	40%		2	1.5Mbps	3Mbps	40%
	:	:	:	:	:	:	:	:	:	:	:	:	:

P10

CONTROL PROGRAM

SERVER AND VLAN OPERATION TABLE

T03

UID	VLAN#	SERVER	ALLOCATED SERVER	CPU UTILIZATION HISTORY		···	SERVER ALLOCATION HISTORY					CHARGE
				BELOW 50%	ABOVE 50%	···	TWO	···	SIX	RESOURCE SHORTAGE	CONTRACT CONDITION EXCESS	
#0	0	WEB	#1	74h	26h	···	15h	···	18h	13h	3h	2M¥
		AP	#1	68h	32h	···	25h	···	20h	3h	5h	
		DB	#1	72h	28h	···	15h	···	16h	2h	4h	
#1	1	WEB	#2	114h	26h	···	24h	···	26h	4h	3h	1M¥
		:	:	:	:	···	:	···	:	:	:	:

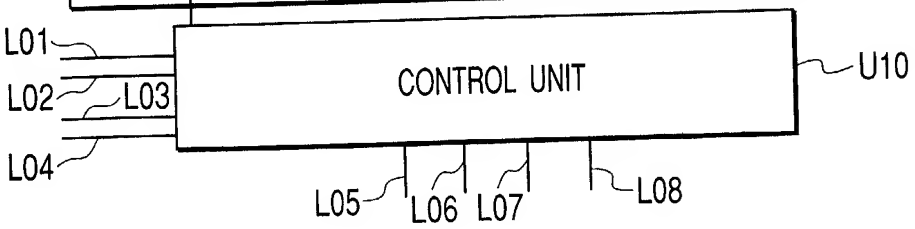


FIG. 7

USER CONDITION SETTING TABLE — T01

UID	SERVER TYPE	VLAN-RELATED				VPN-RELATED				STORAGE NETWORK-RELATED			
		CPU UTILIZATION	LOWER LIMIT OF NUMBER OF UNITS	UPPER LIMIT OF NUMBER OF UNITS	SECURITY SERVICE	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	GUARANTEE BANDWIDTH	LUN ACCESS PRIORITY	NETWORK MINIMUM BANDWIDTH	NETWORK MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION
#0	WEB SERVER	BELOW 50%	ONE	SIX	○	1.5Mbps	5Mbps	40%	1.5Mbps	1	1.5Mbps	5Mbps	40%
	AP SERVER	BELOW 50%	ONE	SIX									
	DB SERVER	BELOW 50%	ONE	SIX									
#1	WEB SERVER	BELOW 50%	ONE	SIX	○	1.5Mbps	3Mbps	40%		2	1.5Mbps	3Mbps	40%
	:	:	:	:	:	:	:	:	:	:	:	:	:

VPN SETTING — T04

UID	BANDWIDTH UTILIZATION	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	GUARANTEE BANDWIDTH	CURRENT USE BANDWIDTH
#0	40%	1.5Mbps	5Mbps	1.5Mbps	1.5Mbps
#1	40%	1.5Mbps	3Mbps		1.5Mbps

VPN OPERATING STATE — T05

UID	VPN ROUTER	BANDWIDTH UTILIZATION		ALLOCATED BANDWIDTH HISTORY					CHARGE
		BELOW 40%	ABOVE 40%	1.5Mbps	···	5Mbps	RESOURCE SHORTAGE	CONTRACT CONDITION EXCESS	
#0	USER	60h	40h	14h	···	52h	2h	14h	0.5M¥
	CARRIER	55h	45h	13h	···	53h	3h	12h	
	DATA CENTER	63h	37h	15h	···	52h	4h	10h	
#1	USER	67h	33h	14h	···	—	3h	4h	0.5M¥
	:	:	:	:	···	:	:	:	:

P10

CONTROL PROGRAM

CONTROL UNIT — U10

L01

L10

L20

FIG. 8

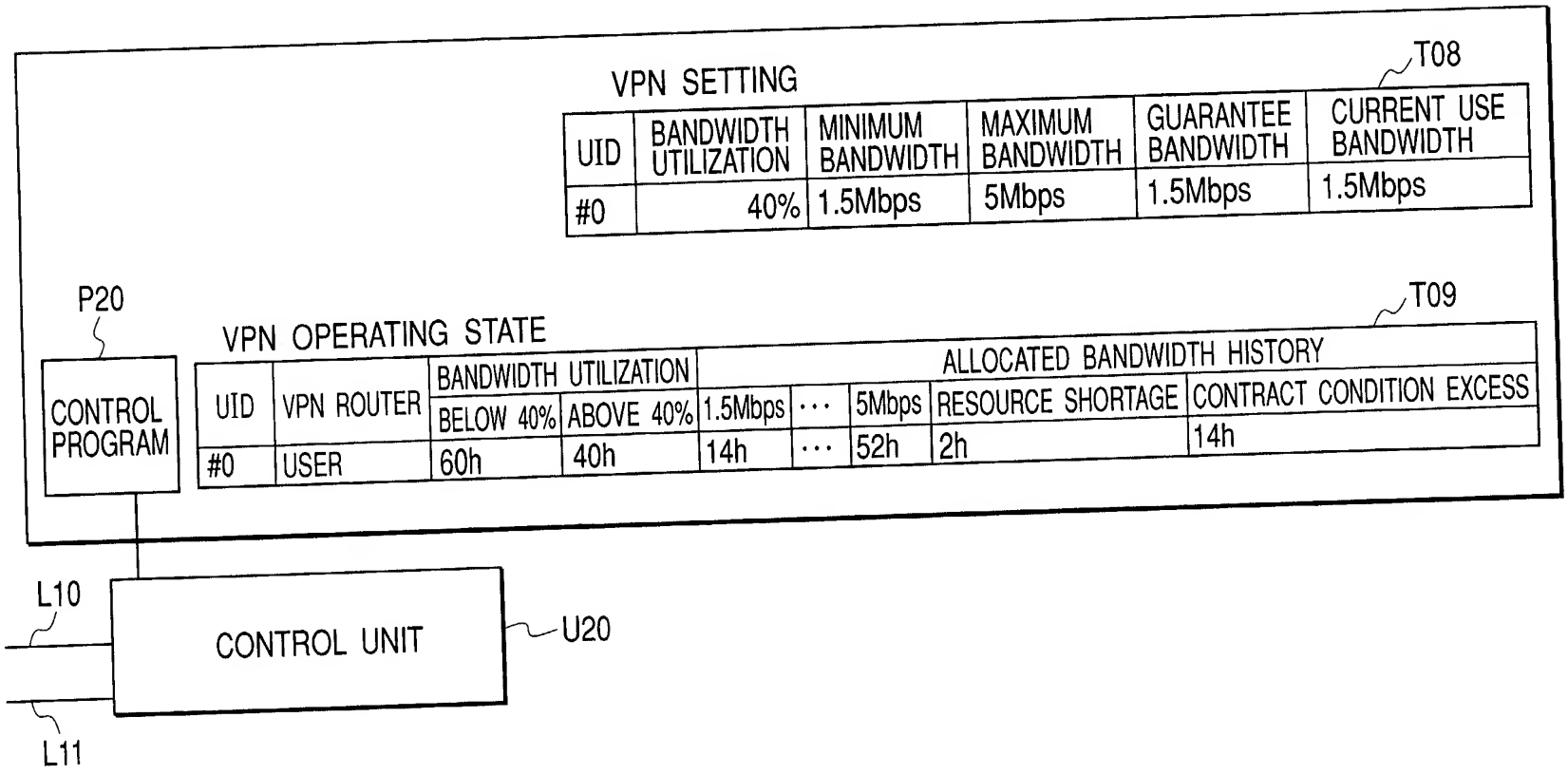

VPN SETTING
T08
UID
BANDWIDTH UTILIZATION
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
GUARANTEE BANDWIDTH
CURRENT USE BANDWIDTH
#0
40%
1.5Mbps
5Mbps
1.5Mbps
1.5Mbps
P20
CONTROL PROGRAM
VPN OPERATING STATE
T09
UID
VPN ROUTER
BANDWIDTH UTILIZATION
ALLOCATED BANDWIDTH HISTORY
BELOW 40%
ABOVE 40%
1.5Mbps
5Mbps
RESOURCE SHORTAGE
CONTRACT CONDITION EXCESS
#0
USER
60h
40h
14h
52h
2h
14h
L10
CONTROL UNIT
U20
L11

FIG. 9

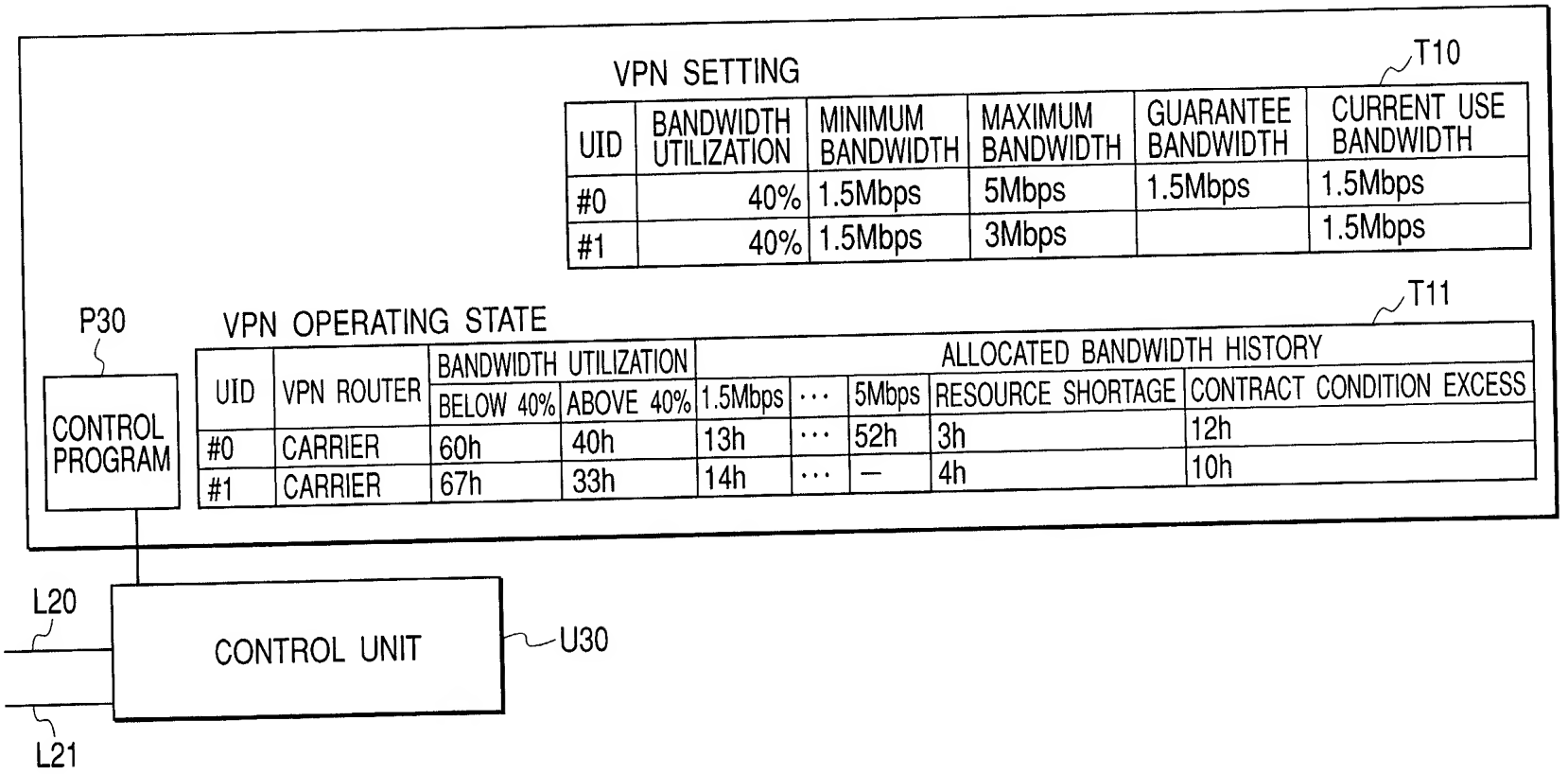

VPN SETTING
T10
UID
BANDWIDTH UTILIZATION
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
GUARANTEE BANDWIDTH
CURRENT USE BANDWIDTH
#0
40%
1.5Mbps
5Mbps
1.5Mbps
1.5Mbps
#1
40%
1.5Mbps
3Mbps
1.5Mbps
P30
VPN OPERATING STATE
T11
UID
VPN ROUTER
BANDWIDTH UTILIZATION
ALLOCATED BANDWIDTH HISTORY
BELOW 40%
ABOVE 40%
1.5Mbps
···
5Mbps
RESOURCE SHORTAGE
CONTRACT CONDITION EXCESS
#0
CARRIER
60h
40h
13h
···
52h
3h
12h
#1
CARRIER
67h
33h
14h
···
—
4h
10h
CONTROL PROGRAM
L20
CONTROL UNIT
U30
L21

FIG. 10

USER CONDITION SETTING TABLE — T01

UID	SERVER TYPE	VLAN-RELATED				VPN-RELATED				STORAGE NETWORK-RELATED			
		CPU UTILIZATION	LOWER LIMIT OF NUMBER OF UNITS	UPPER LIMIT OF NUMBER OF UNITS	SECURITY SERVICE	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	GUARANTEE BANDWIDTH	LUN ACCESS PRIORITY	NETWORK MINIMUM BANDWIDTH	NETWORK MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION
#0	WEB SERVER	BELOW 50%	ONE	SIX	○	1.5Mbps	5Mbps	40%	1.5Mbps	1	1.5Mbps	5Mbps	40%
	AP SERVER	BELOW 50%	ONE	SIX									
	DB SERVER	BELOW 50%	ONE	SIX									
#1	WEB SERVER	BELOW 50%	ONE	SIX	○	1.5Mbps	3Mbps	40%		2	1.5Mbps	3Mbps	40%
	:	:	:	:	:	:	:	:	:	:	:	:	:

STORAGE NETWORK STRUCTURE — T06

UID	VLAN#	ZONE#	PORT#(BELONGING TO ZONE)	DB SERVER (BELONGING TO ZONE)	LUN#	LUN ACCESS PRIORITY	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	CURRENT USE BANDWIDTH	REMARKS
#0	V01	Z01	p501, p601	a30	LU01	1	1.5Mbps	5Mbps	40%	1.5Mbps	
#1	V02	Z02	p502, p601	b30	LU02	2	1.5Mbps	3Mbps	40%	1.5Mbps	

P10

CONTROL PROGRAM

STORAGE NETWORK OPERATING STATE — T07

UID	ZONE	BANDWIDTH UTILIZATION		ALLOCATED BANDWIDTH HISTORY					LUN ACCESS PRIORITY			CHARGE
		BELOW 40%	ABOVE 40%	1.5Mbps	···	5Mbps	RESOURCE SHORTAGE	CONTRACT CONDITION EXCESS	0	···	7	
#0	Z01	63h	27h	53h	···	14h	2h	3h	10h	···	42h	1M¥
#1	Z02	84h	56h	24h	···	—	1h	2h	3h	···	13h	0.5M¥

L07

L08

CONTROL UNIT — U10

FIG. 11

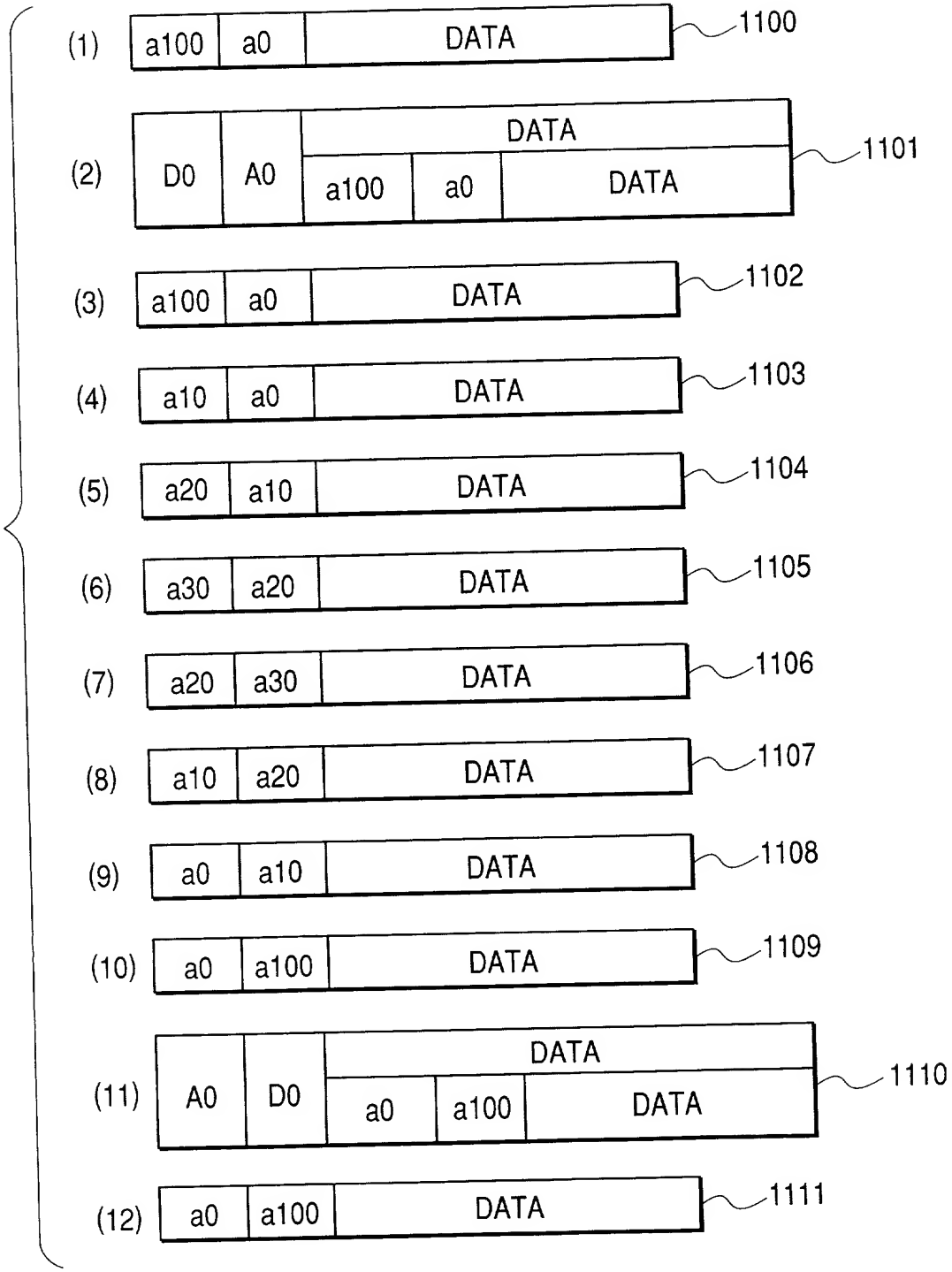

(1)
a100
a0
DATA
1100
(2)
D0
A0
DATA
a100
a0
DATA
1101
(3)
a100
a0
DATA
1102
(4)
a10
a0
DATA
1103
(5)
a20
a10
DATA
1104
(6)
a30
a20
DATA
1105
(7)
a20
a30
DATA
1106
(8)
a10
a20
DATA
1107
(9)
a0
a10
DATA
1108
(10)
a0
a100
DATA
1109
(11)
A0
D0
DATA
a0
a100
DATA
1110
(12)
a0
a100
DATA
1111

FIG. 12

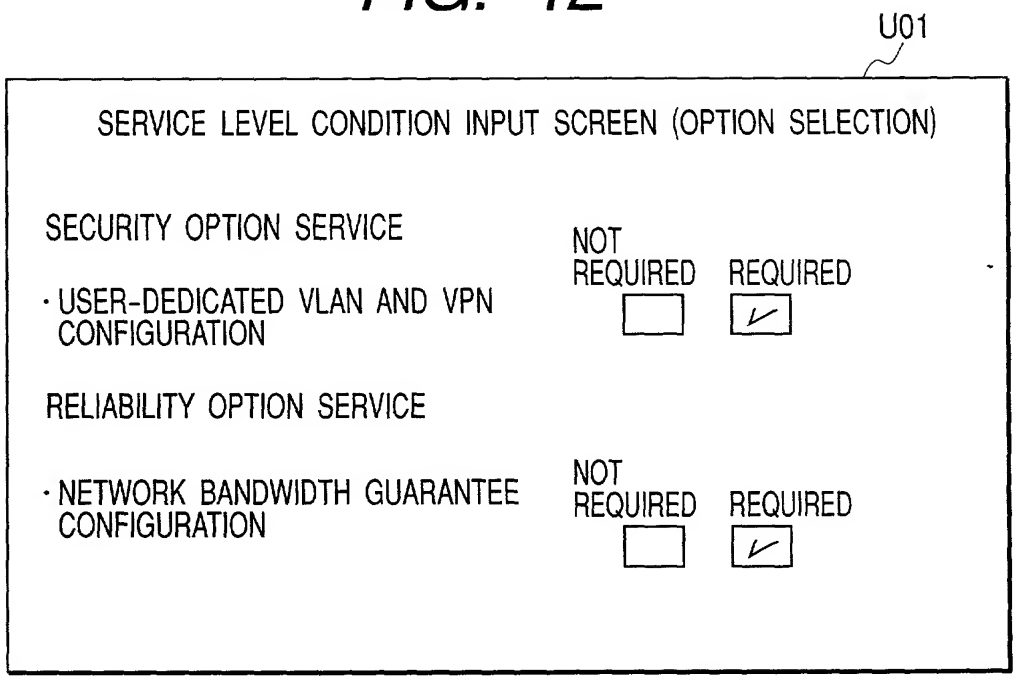

U01
SERVICE LEVEL CONDITION INPUT SCREEN (OPTION SELECTION)
SECURITY OPTION SERVICE
NOT REQUIRED
REQUIRED
· USER-DEDICATED VLAN AND VPN CONFIGURATION
RELIABILITY OPTION SERVICE
· NETWORK BANDWIDTH GUARANTEE CONFIGURATION
NOT REQUIRED
REQUIRED

FIG. 13

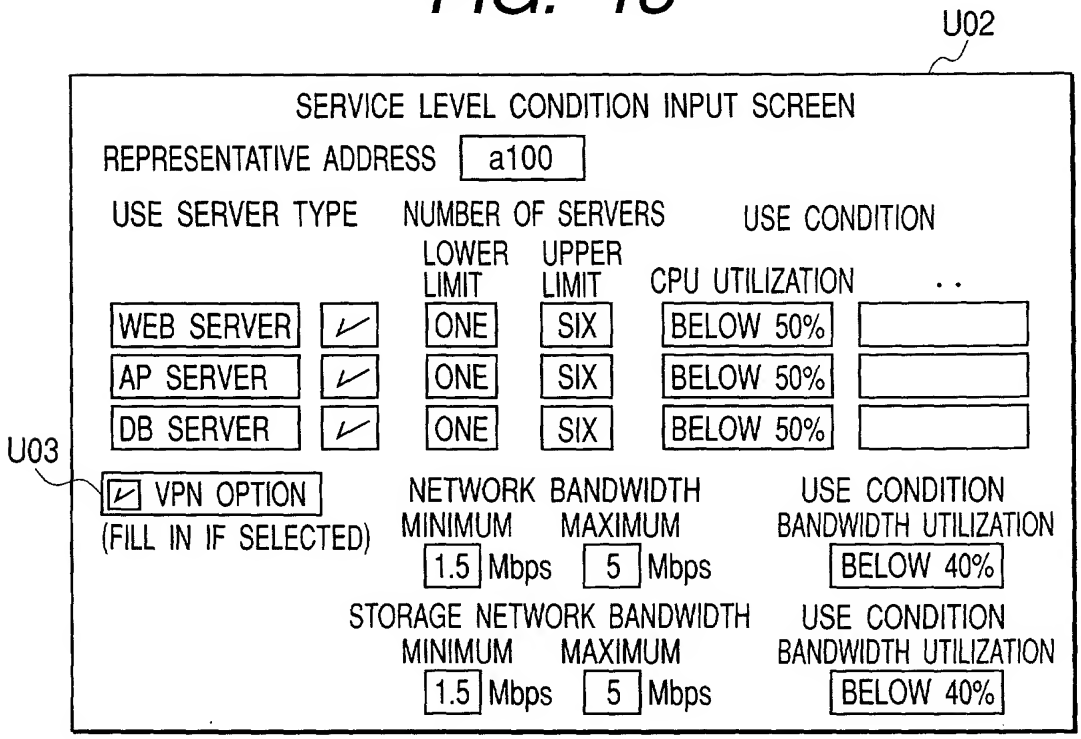

U02
SERVICE LEVEL CONDITION INPUT SCREEN
REPRESENTATIVE ADDRESS a100
USE SERVER TYPE
NUMBER OF SERVERS
LOWER LIMIT
UPPER LIMIT
USE CONDITION
CPU UTILIZATION
WEB SERVER
ONE
SIX
BELOW 50%
AP SERVER
ONE
SIX
BELOW 50%
DB SERVER
ONE
SIX
BELOW 50%
U03
VPN OPTION
(FILL IN IF SELECTED)
NETWORK BANDWIDTH
MINIMUM
MAXIMUM
1.5 Mbps
5 Mbps
USE CONDITION
BANDWIDTH UTILIZATION
BELOW 40%
STORAGE NETWORK BANDWIDTH
MINIMUM
MAXIMUM
1.5 Mbps
5 Mbps
USE CONDITION
BANDWIDTH UTILIZATION
BELOW 40%

FIG. 14

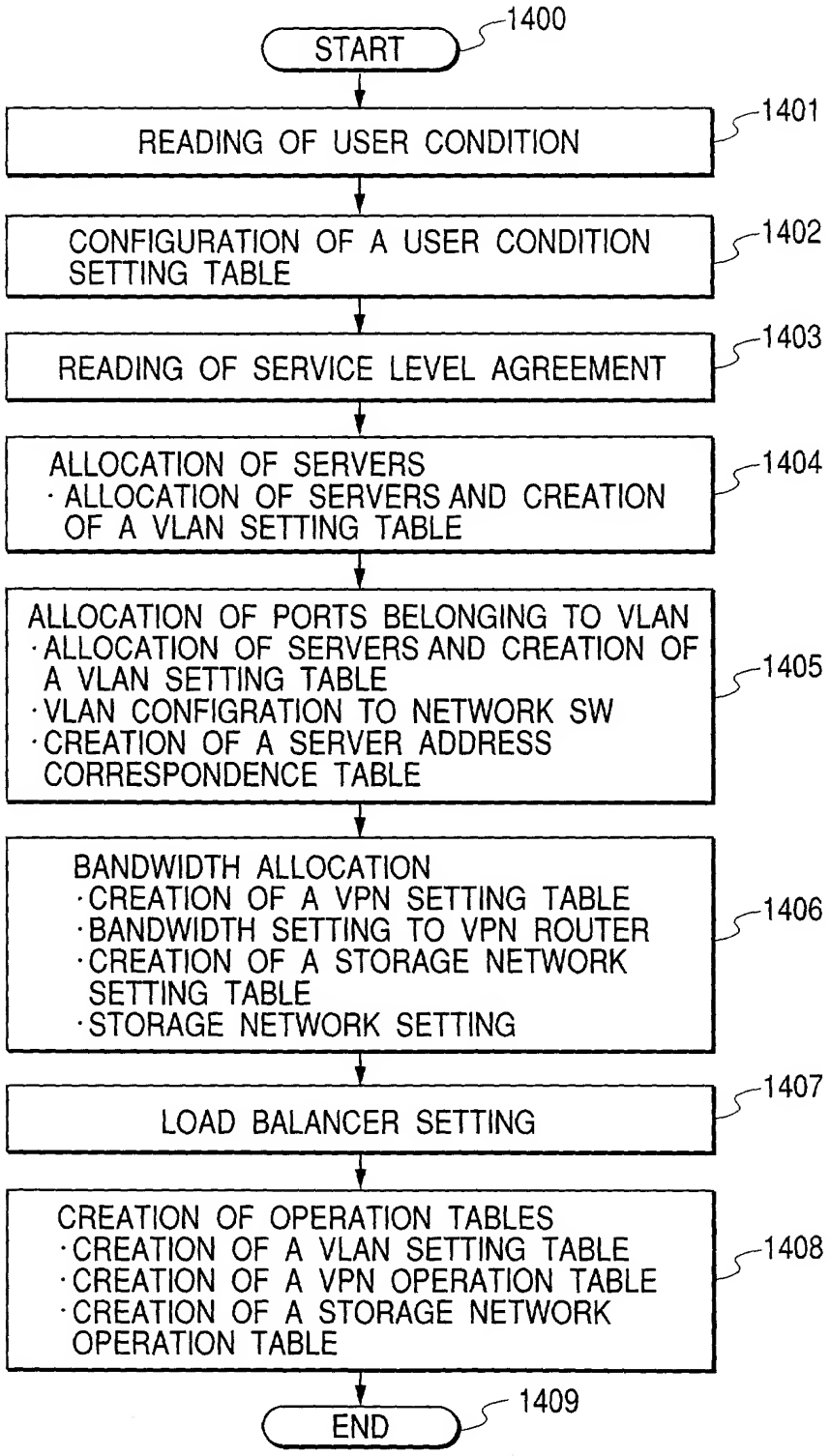

START
1400
READING OF USER CONDITION
1401
CONFIGURATION OF A USER CONDITION SETTING TABLE
1402
READING OF SERVICE LEVEL AGREEMENT
1403
ALLOCATION OF SERVERS
· ALLOCATION OF SERVERS AND CREATION OF A VLAN SETTING TABLE
1404
ALLOCATION OF PORTS BELONGING TO VLAN
· ALLOCATION OF SERVERS AND CREATION OF A VLAN SETTING TABLE
· VLAN CONFIGRATION TO NETWORK SW
· CREATION OF A SERVER ADDRESS CORRESPONDENCE TABLE
1405
BANDWIDTH ALLOCATION
· CREATION OF A VPN SETTING TABLE
· BANDWIDTH SETTING TO VPN ROUTER
· CREATION OF A STORAGE NETWORK SETTING TABLE
· STORAGE NETWORK SETTING
1406
LOAD BALANCER SETTING
1407
CREATION OF OPERATION TABLES
· CREATION OF A VLAN SETTING TABLE
· CREATION OF A VPN OPERATION TABLE
· CREATION OF A STORAGE NETWORK OPERATION TABLE
1408
END
1409

FIG. 15

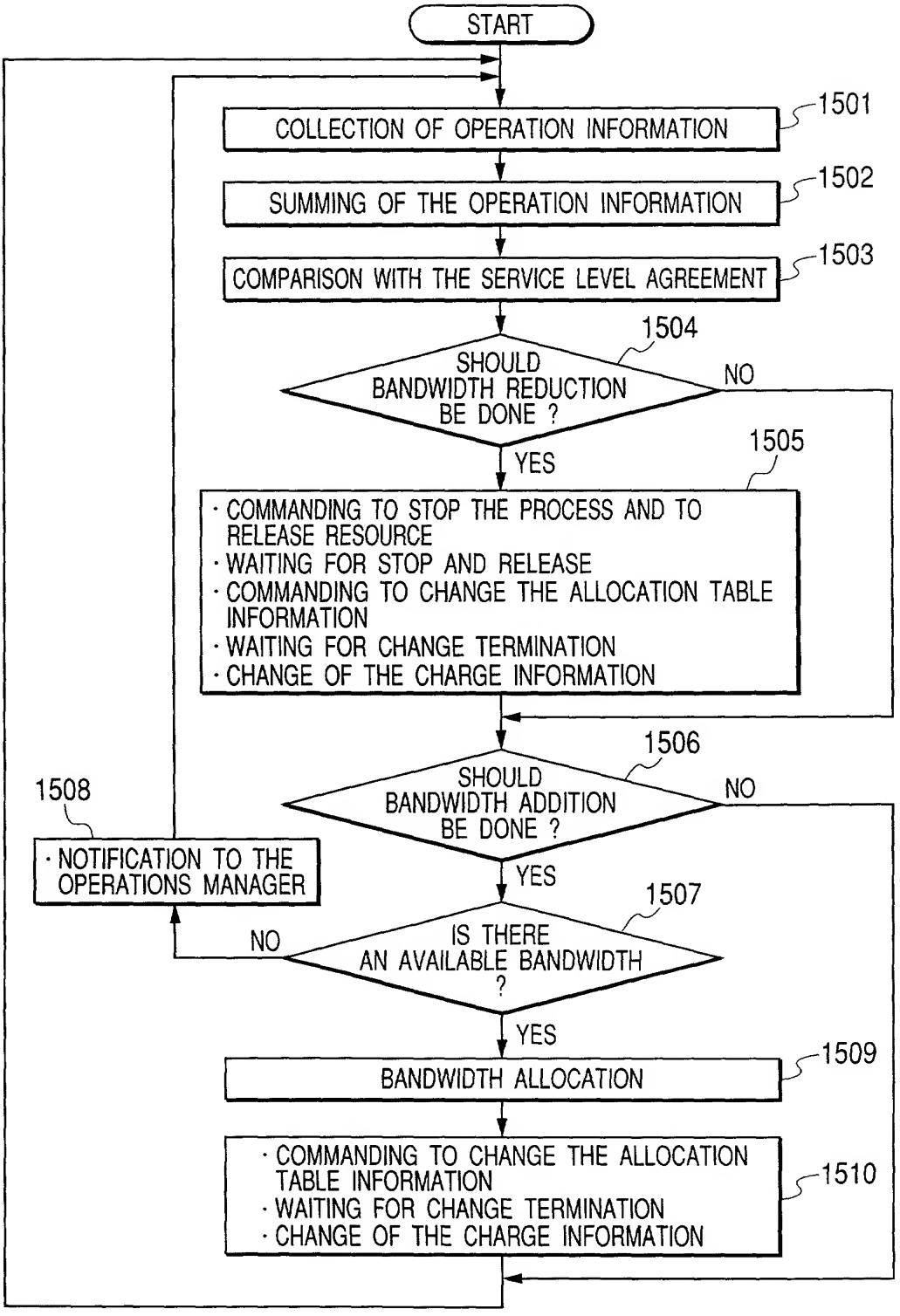

START
COLLECTION OF OPERATION INFORMATION
1501
SUMMING OF THE OPERATION INFORMATION
1502
COMPARISON WITH THE SERVICE LEVEL AGREEMENT
1503
1504
SHOULD BANDWIDTH REDUCTION BE DONE ?
NO
YES
1505
· COMMANDING TO STOP THE PROCESS AND TO RELEASE RESOURCE
· WAITING FOR STOP AND RELEASE
· COMMANDING TO CHANGE THE ALLOCATION TABLE INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
1506
SHOULD BANDWIDTH ADDITION BE DONE ?
NO
YES
1508
· NOTIFICATION TO THE OPERATIONS MANAGER
1507
IS THERE AN AVAILABLE BANDWIDTH ?
NO
YES
BANDWIDTH ALLOCATION
1509
· COMMANDING TO CHANGE THE ALLOCATION TABLE INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
1510

FIG. 16

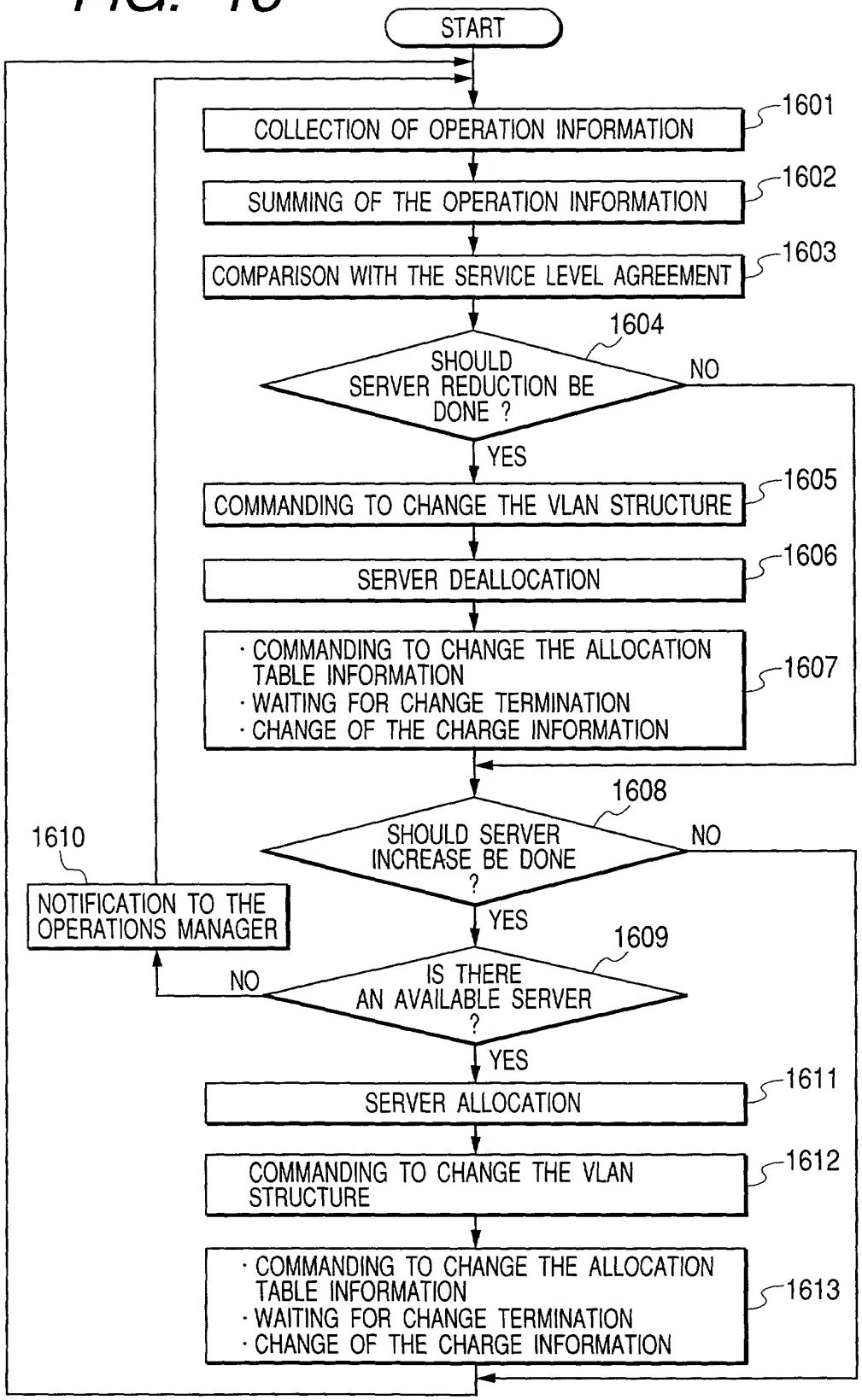

START
COLLECTION OF OPERATION INFORMATION
1601
SUMMING OF THE OPERATION INFORMATION
1602
COMPARISON WITH THE SERVICE LEVEL AGREEMENT
1603
SHOULD SERVER REDUCTION BE DONE ?
1604
NO
YES
COMMANDING TO CHANGE THE VLAN STRUCTURE
1605
SERVER DEALLOCATION
1606
· COMMANDING TO CHANGE THE ALLOCATION TABLE INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
1607
SHOULD SERVER INCREASE BE DONE ?
1608
NO
YES
1610
NOTIFICATION TO THE OPERATIONS MANAGER
IS THERE AN AVAILABLE SERVER ?
1609
NO
YES
SERVER ALLOCATION
1611
COMMANDING TO CHANGE THE VLAN STRUCTURE
1612
· COMMANDING TO CHANGE THE ALLOCATION TABLE INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
1613

FIG. 17

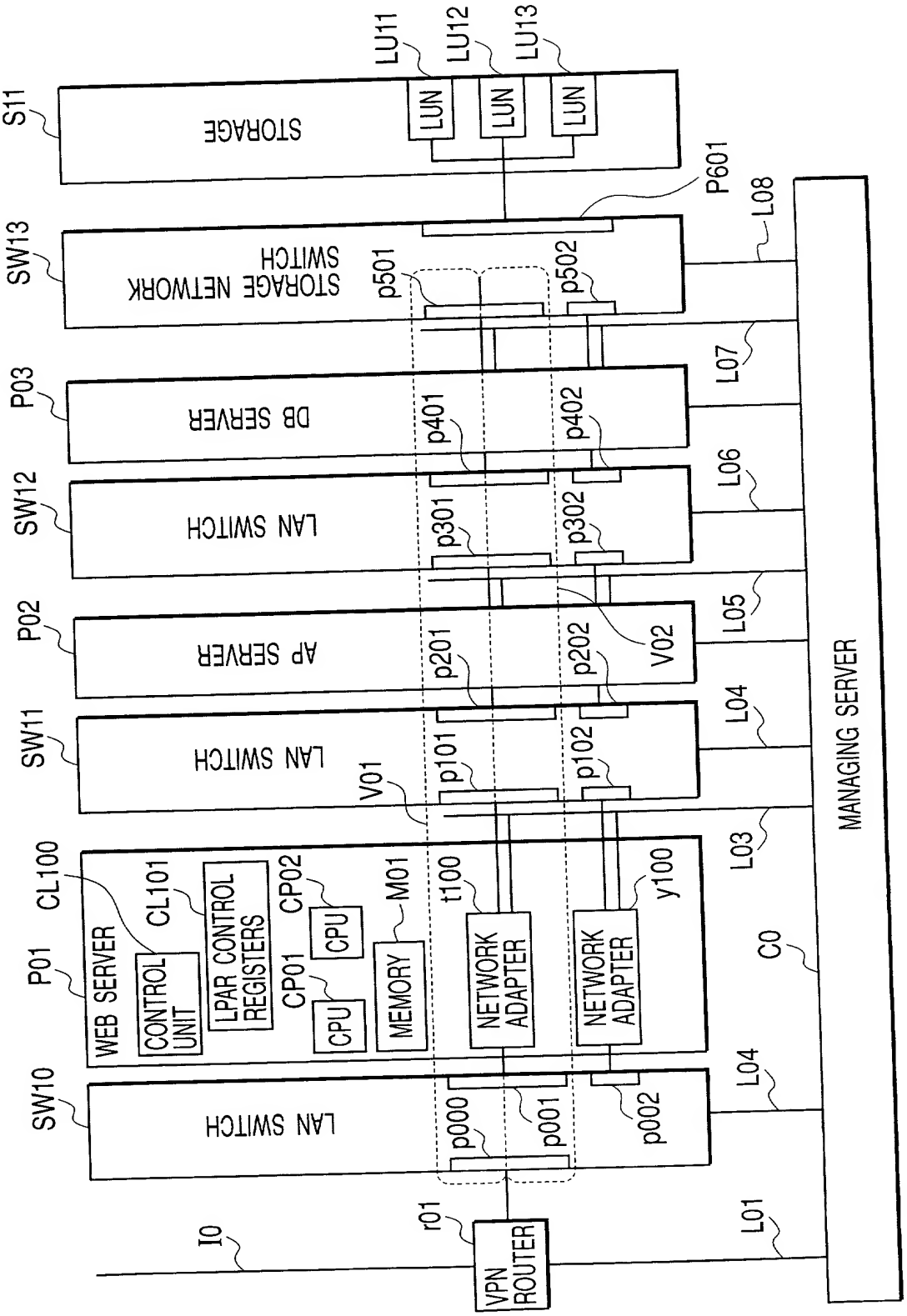

S11
STORAGE
LU11
LU12
LU13
LUN
LUN
LUN
P601
L08
SW13
STORAGE NETWORK SWITCH
p501
p502
L07
P03
DB SERVER
p401
p402
L06
SW12
LAN SWITCH
p301
p302
L05
P02
AP SERVER
p201
p202
V02
L04
SW11
LAN SWITCH
V01
p101
p102
L03
CL100
P01
WEB SERVER
CL101
CONTROL UNIT
LPAR CONTROL REGISTERS
CP02
CP01
CPU
CPU
M01
MEMORY
t100
NETWORK ADAPTER
y100
NETWORK ADAPTER
C0
MANAGING SERVER
SW10
LAN SWITCH
p000
p001
p002
L04
I0
r01
VPN ROUTER
L01

FIG. 18

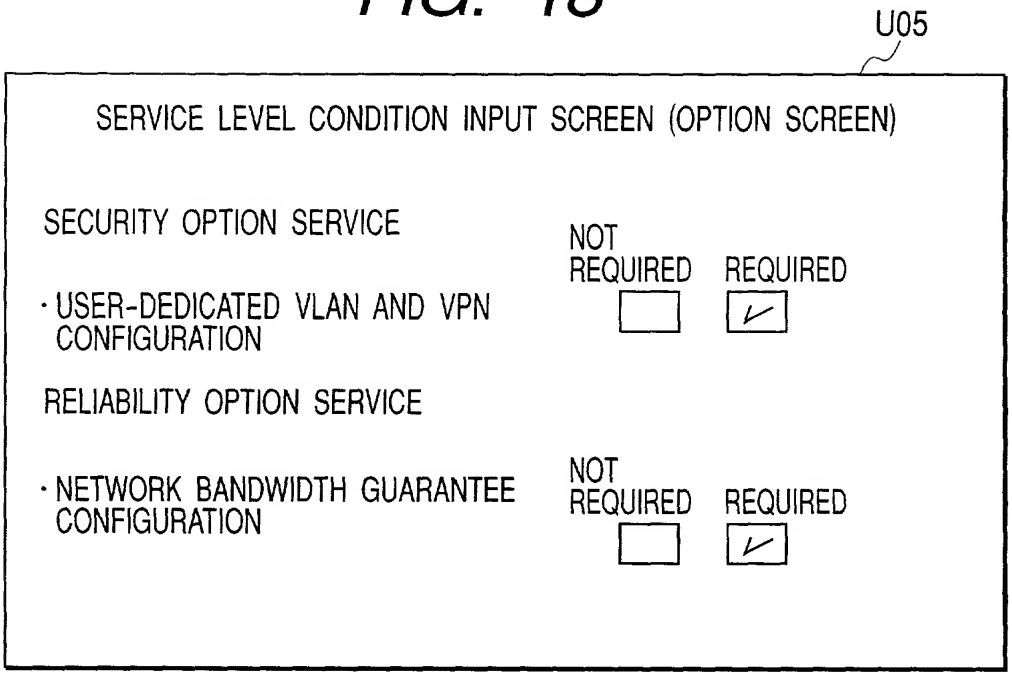
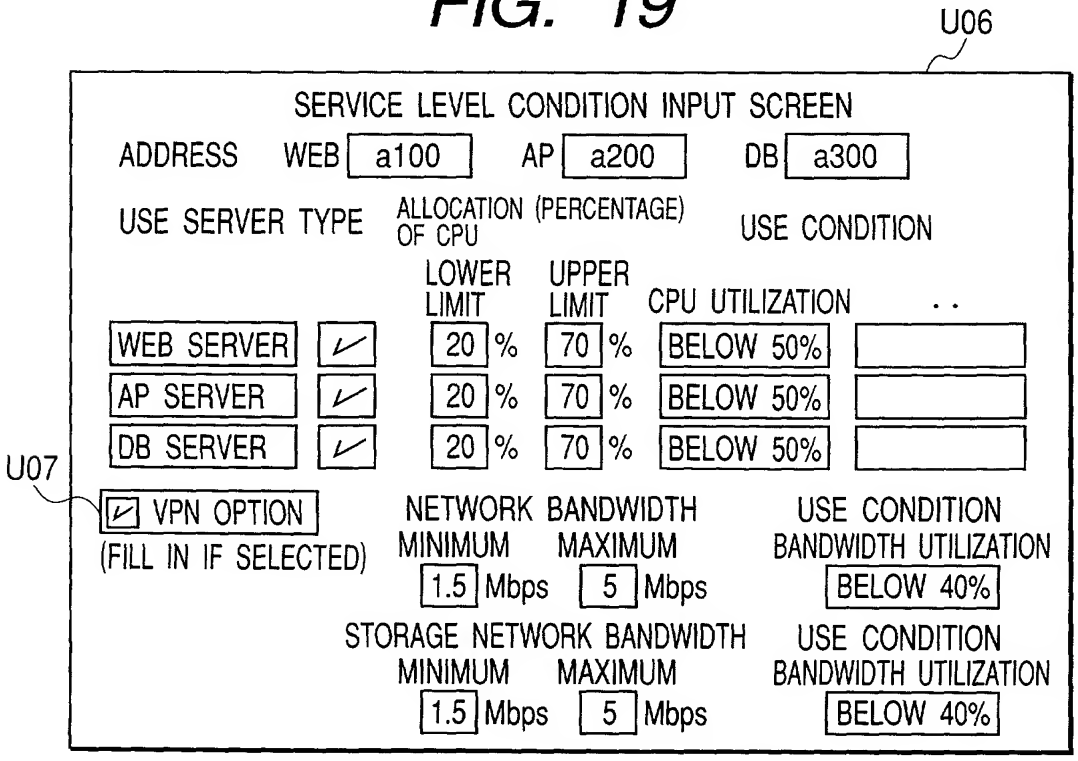

U05
SERVICE LEVEL CONDITION INPUT SCREEN (OPTION SCREEN)
SECURITY OPTION SERVICE
NOT REQUIRED
REQUIRED
· USER-DEDICATED VLAN AND VPN CONFIGURATION
RELIABILITY OPTION SERVICE
· NETWORK BANDWIDTH GUARANTEE CONFIGURATION
NOT REQUIRED
REQUIRED

FIG. 19


U06
SERVICE LEVEL CONDITION INPUT SCREEN
ADDRESS
WEB a100
AP a200
DB a300
USE SERVER TYPE
ALLOCATION (PERCENTAGE) OF CPU
USE CONDITION
LOWER LIMIT
UPPER LIMIT
CPU UTILIZATION
WEB SERVER
AP SERVER
DB SERVER
20 %
70 %
BELOW 50%
U07
VPN OPTION
(FILL IN IF SELECTED)
NETWORK BANDWIDTH
MINIMUM
MAXIMUM
1.5 Mbps
5 Mbps
USE CONDITION
BANDWIDTH UTILIZATION
BELOW 40%
STORAGE NETWORK BANDWIDTH
MINIMUM
MAXIMUM
1.5 Mbps
5 Mbps
USE CONDITION
BANDWIDTH UTILIZATION
BELOW 40%

VLAN STRUCTURE TABLE

UID	LPAR#	VLAN#	NETWORK ADAPTER(P01)	NETWORK ADAPTER(P02)	NETWORK ADAPTER(P03)	ADDRESS (P01)	ADDRESS (P02)	ADDRESS (P03)	PORT# (SW10)	PORT# (SW11)	PORT# (SW12)	SECURITY SERVICE
#0	0	0	t100	t200	t300	a100	a200	a300	p001	p101, p201	p301, p401	○
#1	1	1	t100	t200	t300	b100	b200	b300	p001	p101, p201	p301, p401	○

USER CONDITION SETTING TABLE

T22 T21

UID	SERVER TYPE	VLAN-RELATED				VPN-RELATED				STORAGE NETWORK-RELATED			
		CPU UTILIZATION	LOWER LIMIT OF ALLOCATION (PERCENTAGE) OF CPU UTILIZATION	UPPER LIMIT OF ALLOCATION (PERCENTAGE) OF CPU UTILIZATION	SECURITY SERVICE	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	GUARANTEE BANDWIDTH	LUN ACCESS PRIORITY	NETWORK MINIMUM BANDWIDTH	NETWORK MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION
#0	WEB SERVER	BELOW 50%	20%	70%	○	1.5Mbps	5Mbps	40%	1.5Mbps	1	1.5Mbps	5Mbps	40%
	AP SERVER	BELOW 50%	20%	70%									
	DB SERVER	BELOW 50%	20%	70%									
#1	WEB SERVER	BELOW 50%	20%	70%	○	1.5Mbps	3Mbps	40%		2	1.5Mbps	3Mbps	40%
	:	:	:	:	:	:	:	:	:	:	:	:	:

SERVER AND VLAN OPERATION TABLE

UID	VLAN#	SERVER	ALLOCATED LPAR	CPU UTILIZATION HISTORY		···	CPU ALLOCATION HISTORY					CHARGE
				BELOW 50%	ABOVE 50%	···	20%	···	70%	RESOURCE SHORTAGE	CONTRACT CONDITION EXCESS	
#0	0	WEB	#1	74h	26h	···	15h	···	18h	2h	3h	2M¥
		AP	#1	68h	32h	···	25h	···	20h	1h	2h	
		DB	#1	72h	28h	···	15h	···	16h	13h	3h	
#1	1	WEB	#2	114h	26h	···	24h	···	26h	3h	5h	1M¥
		:	:	:	:	···	:	···	:	:	:	:

T23

CPU ALLOCATION TABLE

UID	SERVER	CPU ALLOCATION
#0	WEB	50%
	AP	50%
	DB	50%
#1	WEB	20%
:	:	:

T24

CONTROL PROGRAM P10

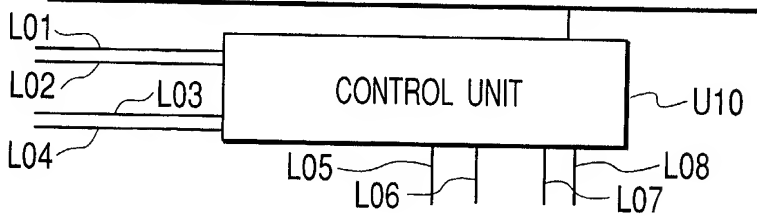


FIG. 20

FIG. 21

USER CONDITION SETTING TABLE

T21

UID	SERVER TYPE	VLAN-RELATED				VPN-RELATED				STORAGE NETWORK-RELATED			
		CPU UTILIZATION	LOWER LIMIT OF ALLOCATION (PERCENTAGE) OF CPU UTILIZATION	UPPER LIMIT OF ALLOCATION (PERCENTAGE) OF CPU UTILIZATION	SECURITY SERVICE	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	GUARANTEE BANDWIDTH	LUN ACCESS PRIORITY	NETWORK MINIMUM BANDWIDTH	NETWORK MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION
#0	WEB SERVER	BELOW 50%	20%	70%	○	1.5Mbps	5Mbps	40%	1.5Mbps	1	1.5Mbps	5Mbps	40%
	AP SERVER	BELOW 50%	20%	70%									
	DB SERVER	BELOW 50%	20%	70%									
#1	WEB SERVER	BELOW 50%	20%	70%	○	1.5Mbps	3Mbps	40%		2	1.5Mbps	3Mbps	40%
	:	:	:	:	:	:	:	:	:	:	:	:	:

VPN SETTING

T25

UID	BANDWIDTH UTILIZATION	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	GUARANTEE BANDWIDTH	CURRENT USE BANDWIDTH
#0	40%	1.5Mbps	5Mbps	1.5Mbps	1.5Mbps
#1	40%	1.5Mbps	3Mbps		1.5Mbps

P10

CONTROL PROGRAM

VPN OPERATING STATE

T26

UID	VPN ROUTER	BANDWIDTH UTILIZATION		ALLOCATED BANDWIDTH HISTORY					CHARGE
		BELOW 40%	ABOVE 40%	1.5Mbps	···	5Mbps	RESOURCE SHORTAGE	CONTRACT CONDITION EXCESS	
#0	USER	60h	40h	14h	···	52h	2h	14h	0.5M¥
	CARRIER	55h	45h	13h	···	53h	3h	12h	
	DATA CENTER	63h	37h	15h	···	52h	4h	10h	
#1	USER	67h	33h	14h	···	—	3h	4h	0.5M¥
	:	:	:	:	···	:	:	:	:

L01

L10

L20

CONTROL UNIT

U10

FIG. 22

USER CONDITION SETTING TABLE

T21

UID	SERVER TYPE	VLAN-RELATED				VPN-RELATED				STORAGE NETWORK-RELATED			
		CPU UTILIZATION	LOWER LIMIT OF ALLOCATION (PERCENTAGE) OF CPU UTILIZATION	UPPER LIMIT OF ALLOCATION (PERCENTAGE) OF CPU UTILIZATION	SECURITY SERVICE	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	GUARANTEE BANDWIDTH	LUN ACCESS PRIORITY	NETWORK MINIMUM BANDWIDTH	NETWORK MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION
#0	WEB SERVER	BELOW 50%	20%	70%	○	1.5Mbps	5Mbps	40%	1.5Mbps	1	1.5Mbps	5Mbps	40%
	AP SERVER	BELOW 50%	20%	70%									
	DB SERVER	BELOW 50%	20%	70%									
#1	WEB SERVER	BELOW 50%	20%	70%	○	1.5Mbps	3Mbps	40%		2	1.5Mbps	3Mbps	40%
	:	:	:	:	:	:	:	:	:	:	:	:	:

STORAGE NETWORK STRUCTURE

T27

UID	VLAN#	ZONE#	PORT#(BELONGING TO ZONE)	DB SERVER (BELONGING TO ZONE)	LUN#	LUN ACCESS PRIORITY	MINIMUM BANDWIDTH	MAXIMUM BANDWIDTH	BANDWIDTH UTILIZATION	CURRENT USE BANDWIDTH	REMARKS
#0	V01	Z01	p501, p601	a300	LU11	1	1.5Mbps	5Mbps	40%	1.5Mbps	
#1	V02	Z02	p501, p601	b300	LU12	2	1.5Mbps	3Mbps	40%	1.5Mbps	

P10

CONTROL PROGRAM

STORAGE NETWORK OPERATING STATE

T28

UID	ZONE	BANDWIDTH UTILIZATION		ALLOCATED BANDWIDTH HISTORY					LUN ACCESS PRIORITY			CHARGE
		BELOW 40%	ABOVE 40%	1.5Mbps	...	5Mbps	RESOURCE SHORTAGE	CONTRACT CONDITION EXCESS	0	...	7	
#0	Z01	63h	27h	53h	...	14h	2h	3h	10h	...	42h	1M¥
#1	Z02	84h	56h	24h	...	—	1h	2h	3h	...	13h	0.5M¥

L07

L08

CONTROL UNIT

U10

FIG. 23

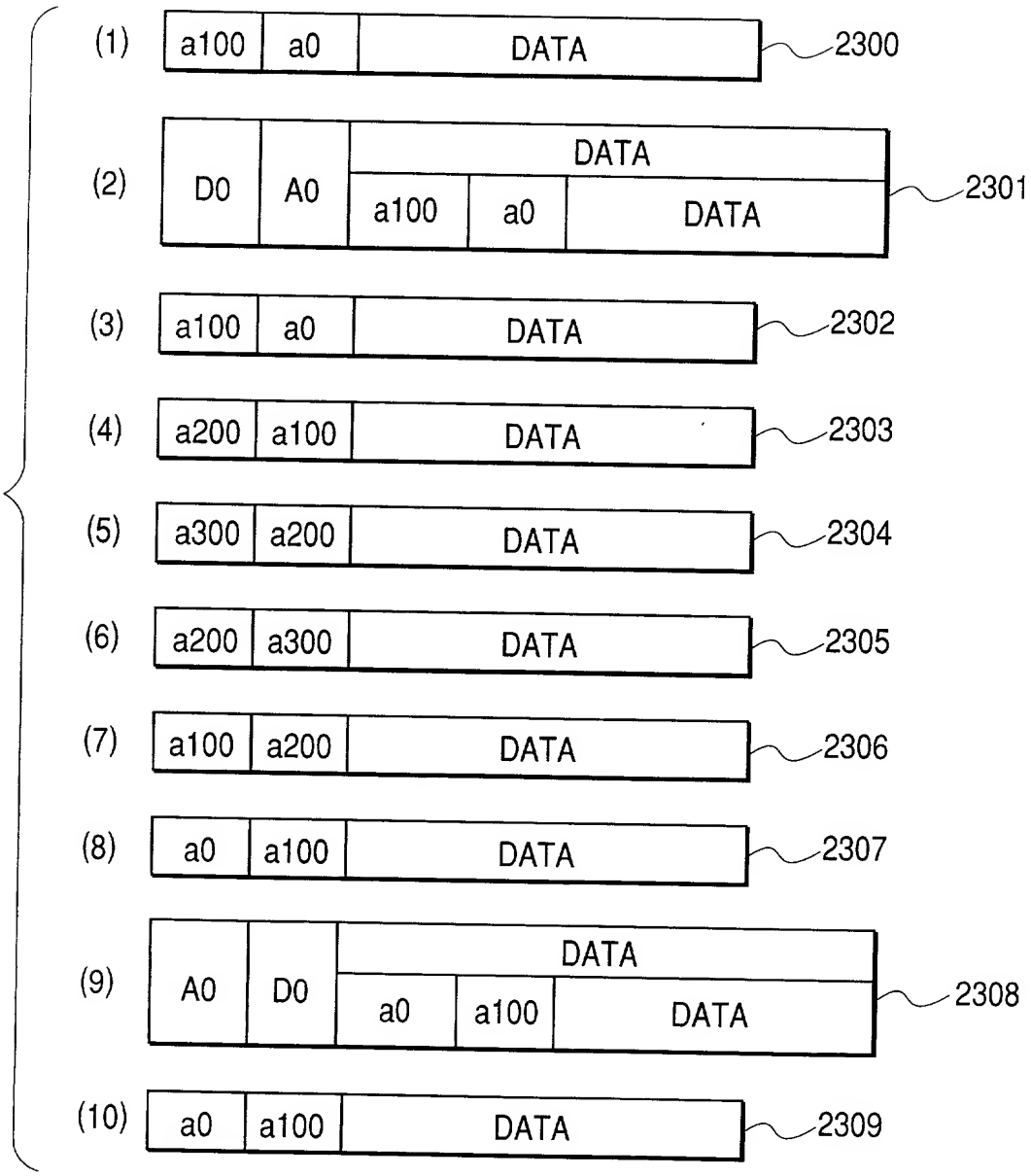

(1)
a100
a0
DATA
2300
(2)
D0
A0
DATA
a100
a0
DATA
2301
(3)
a100
a0
DATA
2302
(4)
a200
a100
DATA
2303
(5)
a300
a200
DATA
2304
(6)
a200
a300
DATA
2305
(7)
a100
a200
DATA
2306
(8)
a0
a100
DATA
2307
(9)
A0
D0
DATA
a0
a100
DATA
2308
(10)
a0
a100
DATA
2309

FIG. 24

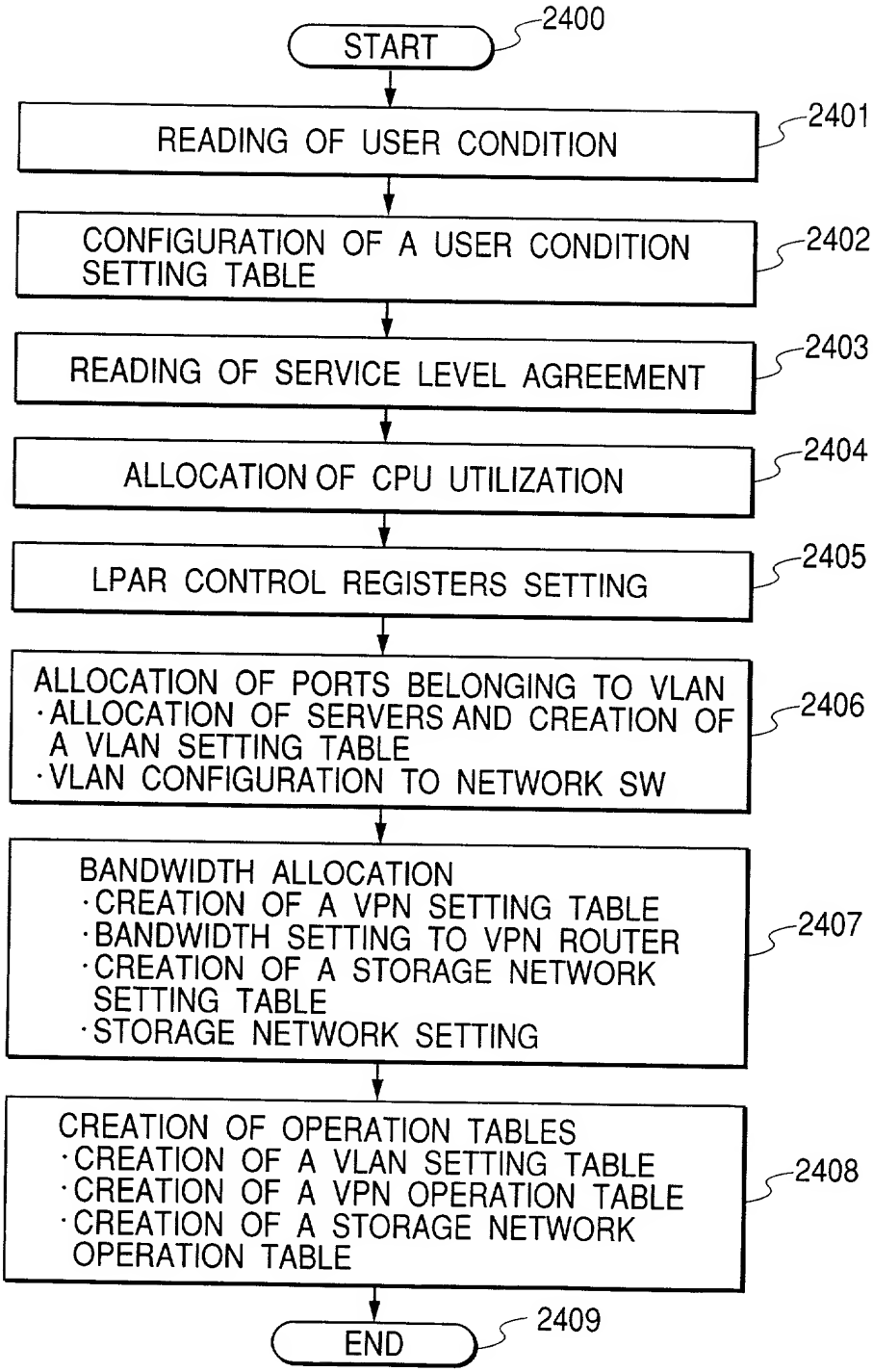

START
2400
READING OF USER CONDITION
2401
CONFIGURATION OF A USER CONDITION SETTING TABLE
2402
READING OF SERVICE LEVEL AGREEMENT
2403
ALLOCATION OF CPU UTILIZATION
2404
LPAR CONTROL REGISTERS SETTING
2405
ALLOCATION OF PORTS BELONGING TO VLAN
·ALLOCATION OF SERVERS AND CREATION OF A VLAN SETTING TABLE
·VLAN CONFIGURATION TO NETWORK SW
2406
BANDWIDTH ALLOCATION
·CREATION OF A VPN SETTING TABLE
·BANDWIDTH SETTING TO VPN ROUTER
·CREATION OF A STORAGE NETWORK SETTING TABLE
·STORAGE NETWORK SETTING
2407
CREATION OF OPERATION TABLES
·CREATION OF A VLAN SETTING TABLE
·CREATION OF A VPN OPERATION TABLE
·CREATION OF A STORAGE NETWORK OPERATION TABLE
2408
END
2409

FIG. 25

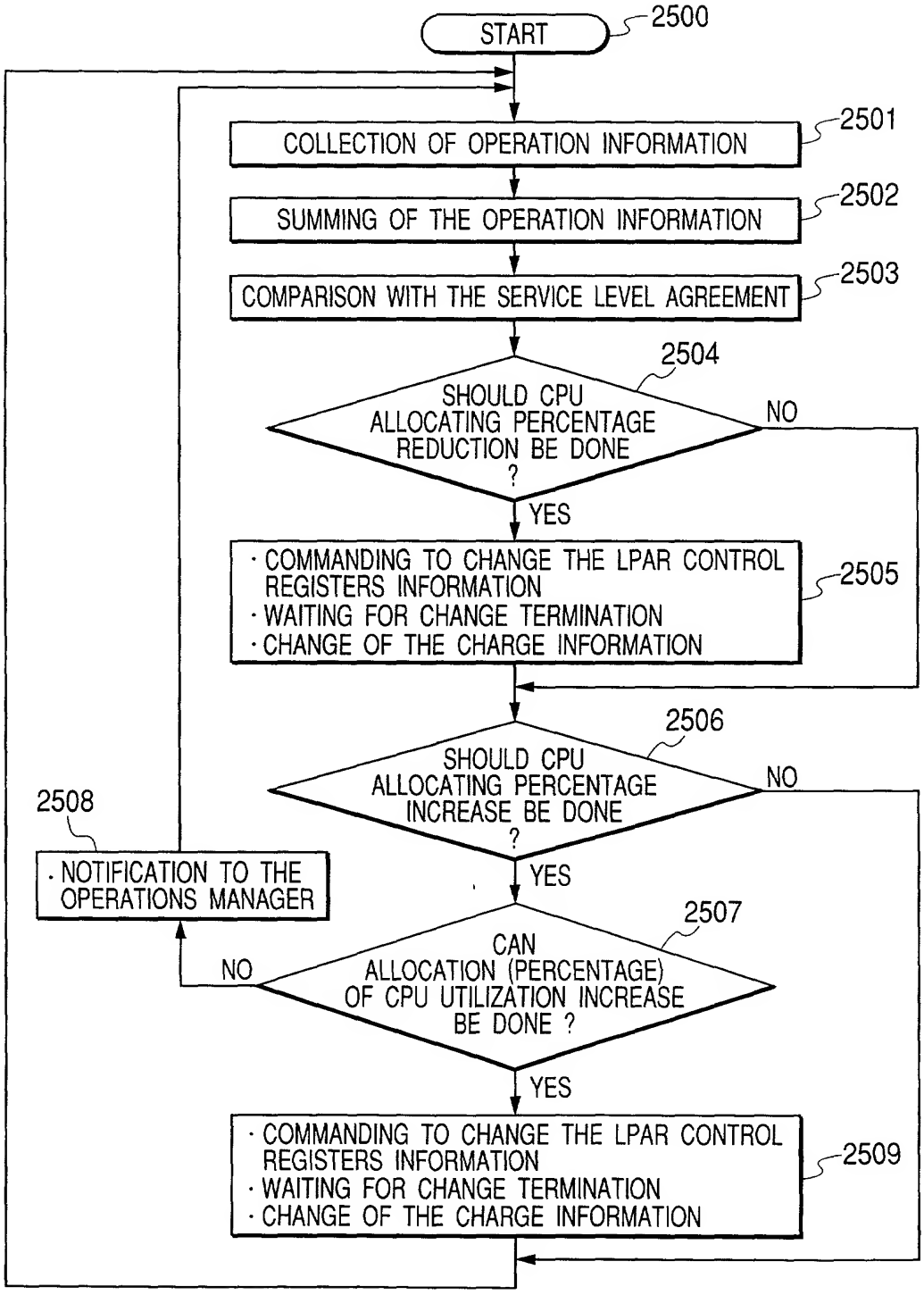

START
2500
COLLECTION OF OPERATION INFORMATION
2501
SUMMING OF THE OPERATION INFORMATION
2502
COMPARISON WITH THE SERVICE LEVEL AGREEMENT
2503
SHOULD CPU ALLOCATING PERCENTAGE REDUCTION BE DONE ?
2504
NO
YES
· COMMANDING TO CHANGE THE LPAR CONTROL REGISTERS INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
2505
SHOULD CPU ALLOCATING PERCENTAGE INCREASE BE DONE ?
2506
NO
YES
2508
· NOTIFICATION TO THE OPERATIONS MANAGER
CAN ALLOCATION (PERCENTAGE) OF CPU UTILIZATION INCREASE BE DONE ?
2507
NO
YES
· COMMANDING TO CHANGE THE LPAR CONTROL REGISTERS INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
2509

FIG. 26

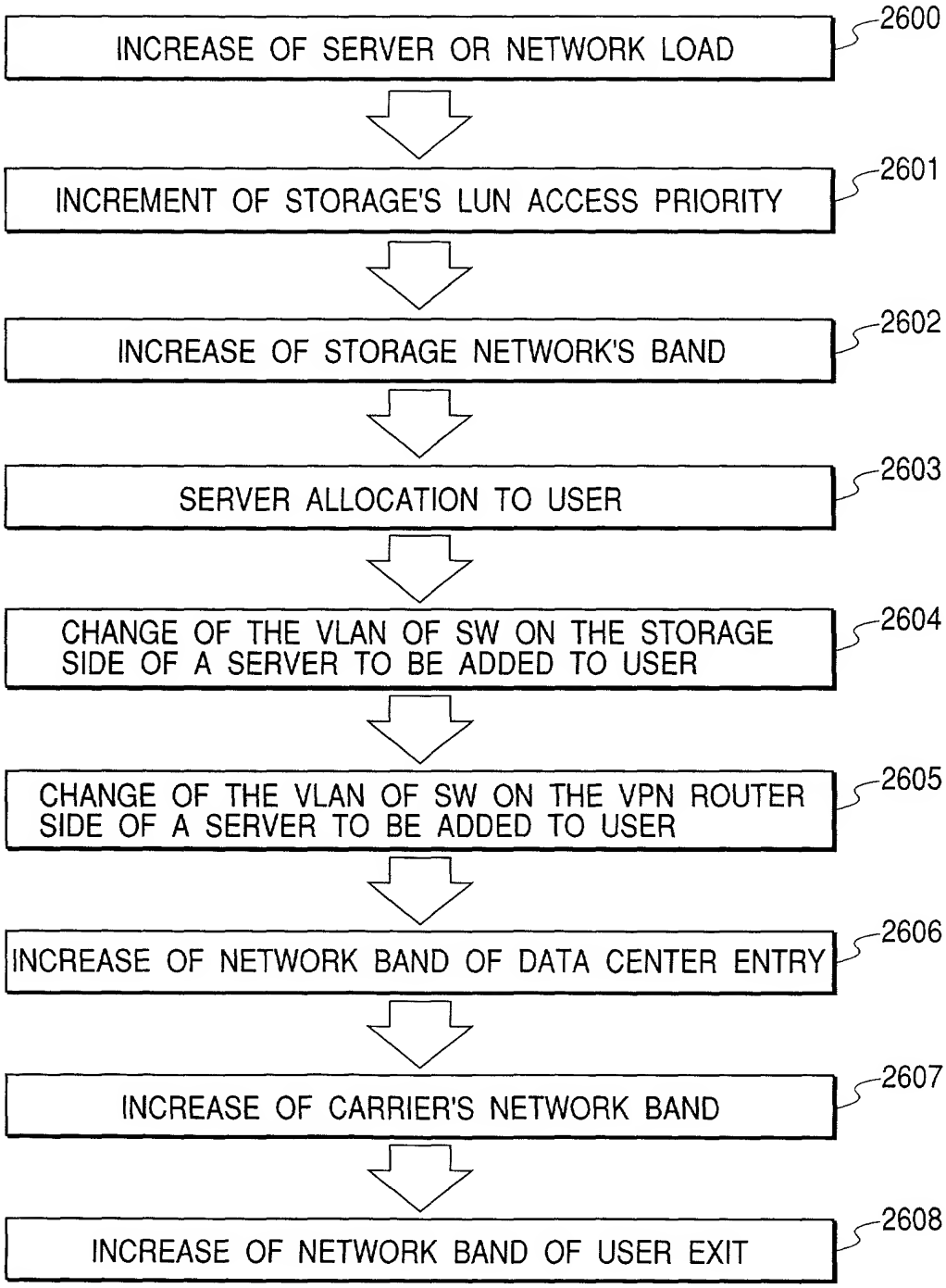

INCREASE OF SERVER OR NETWORK LOAD
2600
INCREMENT OF STORAGE'S LUN ACCESS PRIORITY
2601
INCREASE OF STORAGE NETWORK'S BAND
2602
SERVER ALLOCATION TO USER
2603
CHANGE OF THE VLAN OF SW ON THE STORAGE SIDE OF A SERVER TO BE ADDED TO USER
2604
CHANGE OF THE VLAN OF SW ON THE VPN ROUTER SIDE OF A SERVER TO BE ADDED TO USER
2605
INCREASE OF NETWORK BAND OF DATA CENTER ENTRY
2606
INCREASE OF CARRIER'S NETWORK BAND
2607
INCREASE OF NETWORK BAND OF USER EXIT
2608

FIG. 27

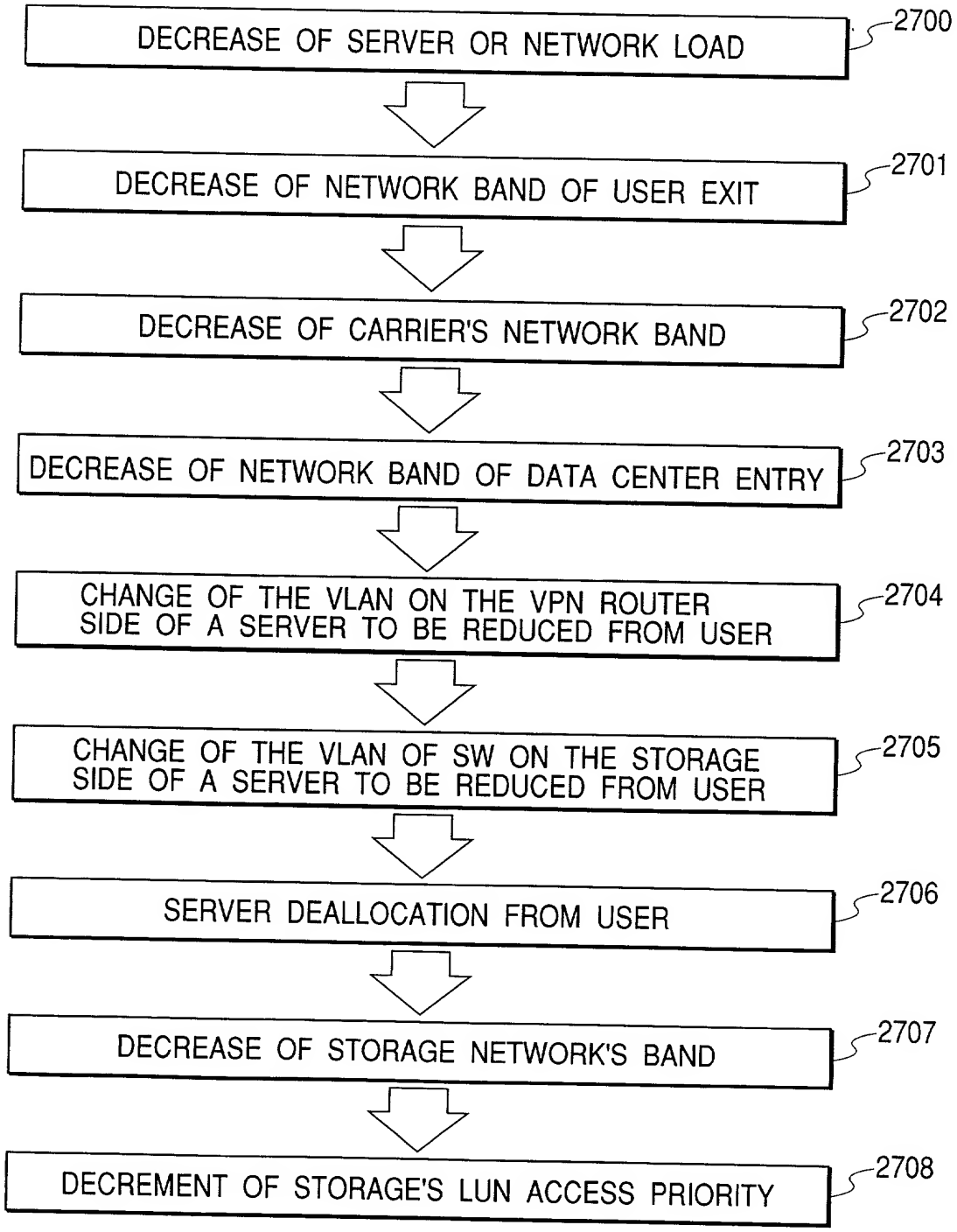

DECREASE OF SERVER OR NETWORK LOAD
2700
DECREASE OF NETWORK BAND OF USER EXIT
2701
DECREASE OF CARRIER'S NETWORK BAND
2702
DECREASE OF NETWORK BAND OF DATA CENTER ENTRY
2703
CHANGE OF THE VLAN ON THE VPN ROUTER SIDE OF A SERVER TO BE REDUCED FROM USER
2704
CHANGE OF THE VLAN OF SW ON THE STORAGE SIDE OF A SERVER TO BE REDUCED FROM USER
2705
SERVER DEALLOCATION FROM USER
2706
DECREASE OF STORAGE NETWORK'S BAND
2707
DECREMENT OF STORAGE'S LUN ACCESS PRIORITY
2708

FIG. 28

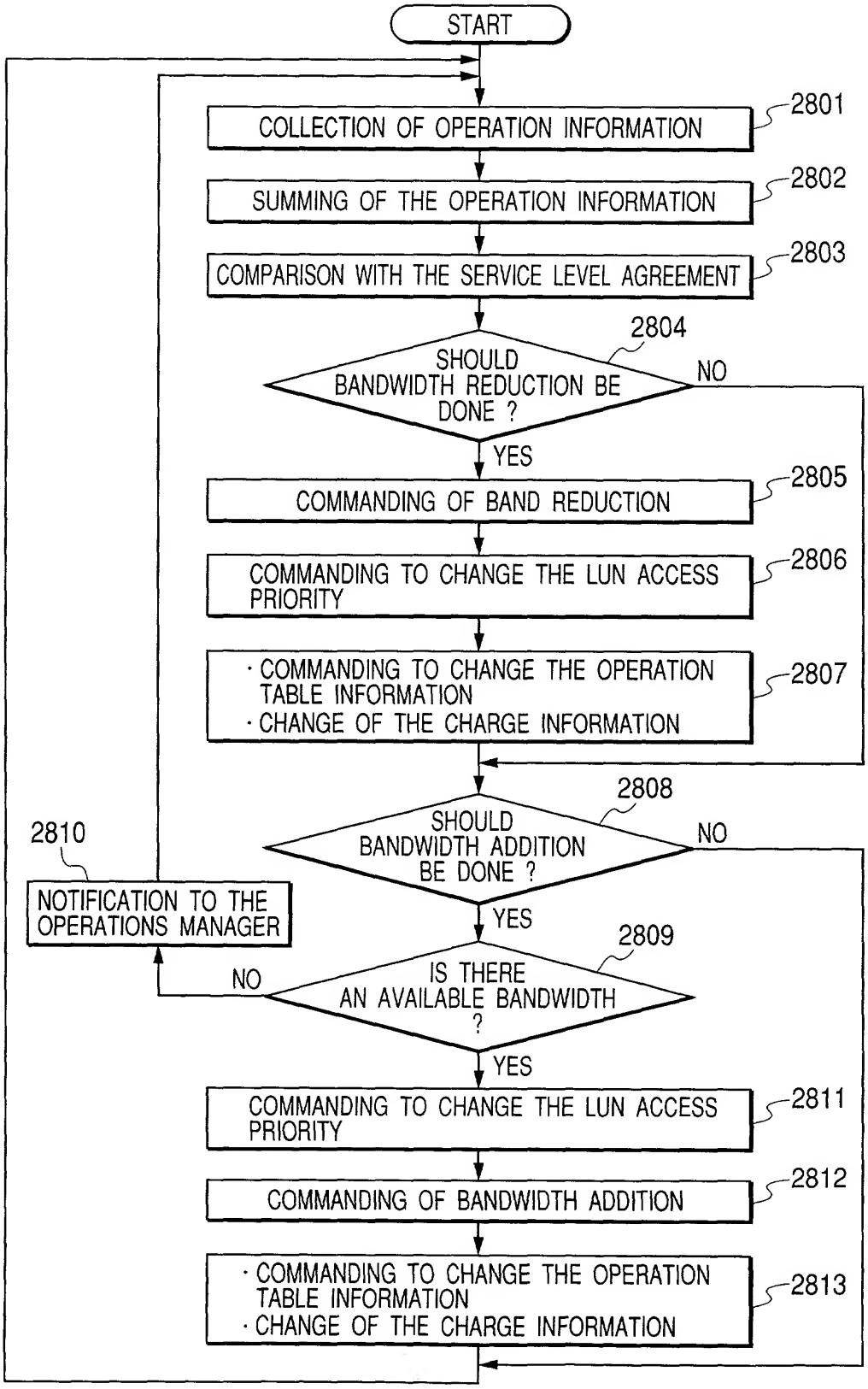

START
COLLECTION OF OPERATION INFORMATION
2801
SUMMING OF THE OPERATION INFORMATION
2802
COMPARISON WITH THE SERVICE LEVEL AGREEMENT
2803
SHOULD BANDWIDTH REDUCTION BE DONE ?
2804
NO
YES
COMMANDING OF BAND REDUCTION
2805
COMMANDING TO CHANGE THE LUN ACCESS PRIORITY
2806
· COMMANDING TO CHANGE THE OPERATION TABLE INFORMATION
· CHANGE OF THE CHARGE INFORMATION
2807
SHOULD BANDWIDTH ADDITION BE DONE ?
2808
NO
YES
2810
NOTIFICATION TO THE OPERATIONS MANAGER
IS THERE AN AVAILABLE BANDWIDTH ?
2809
NO
YES
COMMANDING TO CHANGE THE LUN ACCESS PRIORITY
2811
COMMANDING OF BANDWIDTH ADDITION
2812
· COMMANDING TO CHANGE THE OPERATION TABLE INFORMATION
· CHANGE OF THE CHARGE INFORMATION
2813

FIG. 29

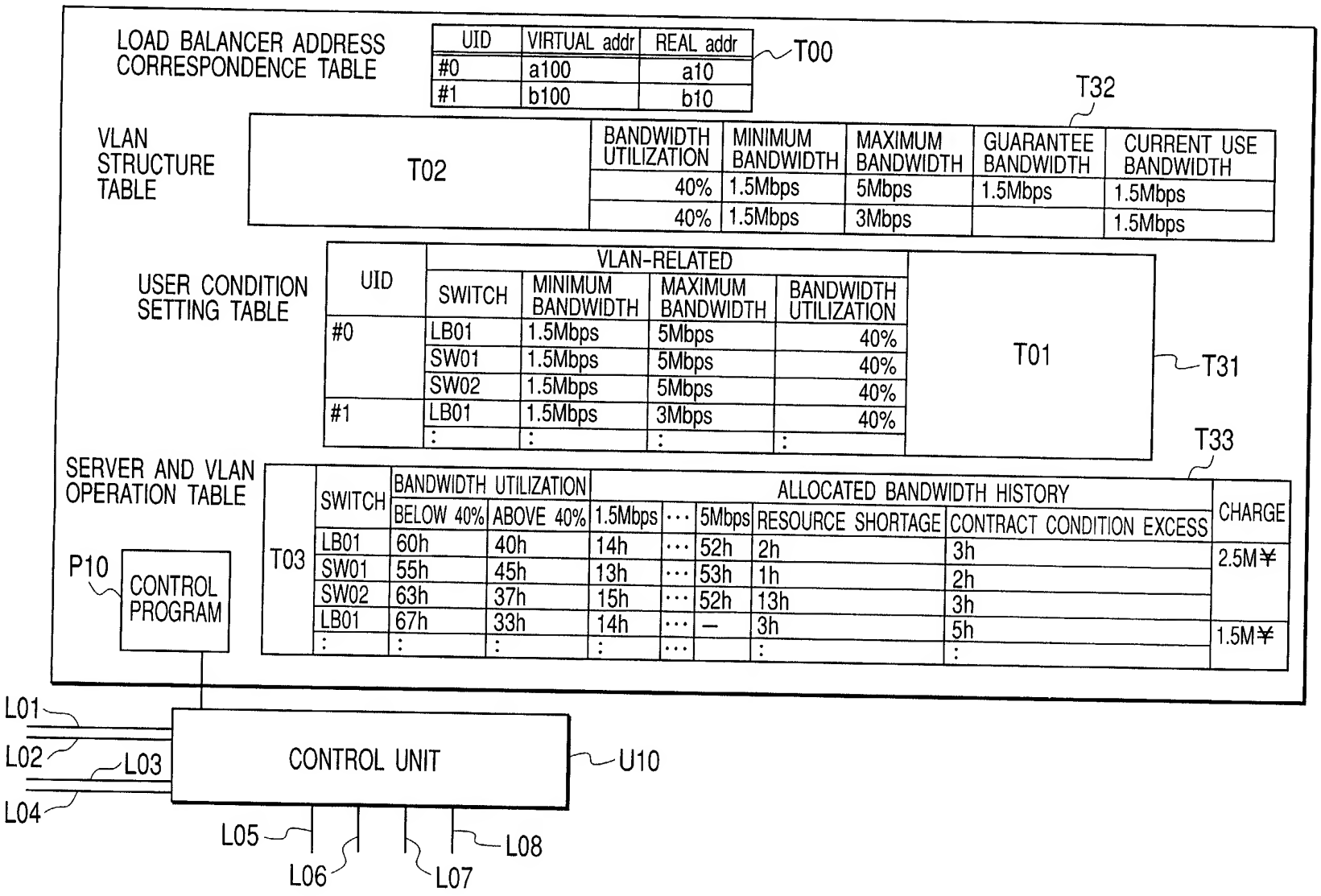

LOAD BALANCER ADDRESS CORRESPONDENCE TABLE
UID
VIRTUAL addr
REAL addr
#0
a100
a10
#1
b100
b10
T00
VLAN STRUCTURE TABLE
T02
T32
BANDWIDTH UTILIZATION
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
GUARANTEE BANDWIDTH
CURRENT USE BANDWIDTH
40%
1.5Mbps
5Mbps
1.5Mbps
1.5Mbps
40%
1.5Mbps
3Mbps
1.5Mbps
USER CONDITION SETTING TABLE
UID
VLAN-RELATED
SWITCH
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
BANDWIDTH UTILIZATION
#0
LB01
1.5Mbps
5Mbps
40%
SW01
1.5Mbps
5Mbps
40%
SW02
1.5Mbps
5Mbps
40%
#1
LB01
1.5Mbps
3Mbps
40%
T01
T31
SERVER AND VLAN OPERATION TABLE
T03
T33
SWITCH
BANDWIDTH UTILIZATION
BELOW 40%
ABOVE 40%
ALLOCATED BANDWIDTH HISTORY
1.5Mbps
5Mbps
RESOURCE SHORTAGE
CONTRACT CONDITION EXCESS
CHARGE
LB01
60h
40h
14h
52h
2h
3h
2.5M¥
SW01
55h
45h
13h
53h
1h
2h
SW02
63h
37h
15h
52h
13h
3h
LB01
67h
33h
14h
—
3h
5h
1.5M¥
P10
CONTROL PROGRAM
L01
L02
L03
L04
CONTROL UNIT
U10
L05
L06
L07
L08

FIG. 30

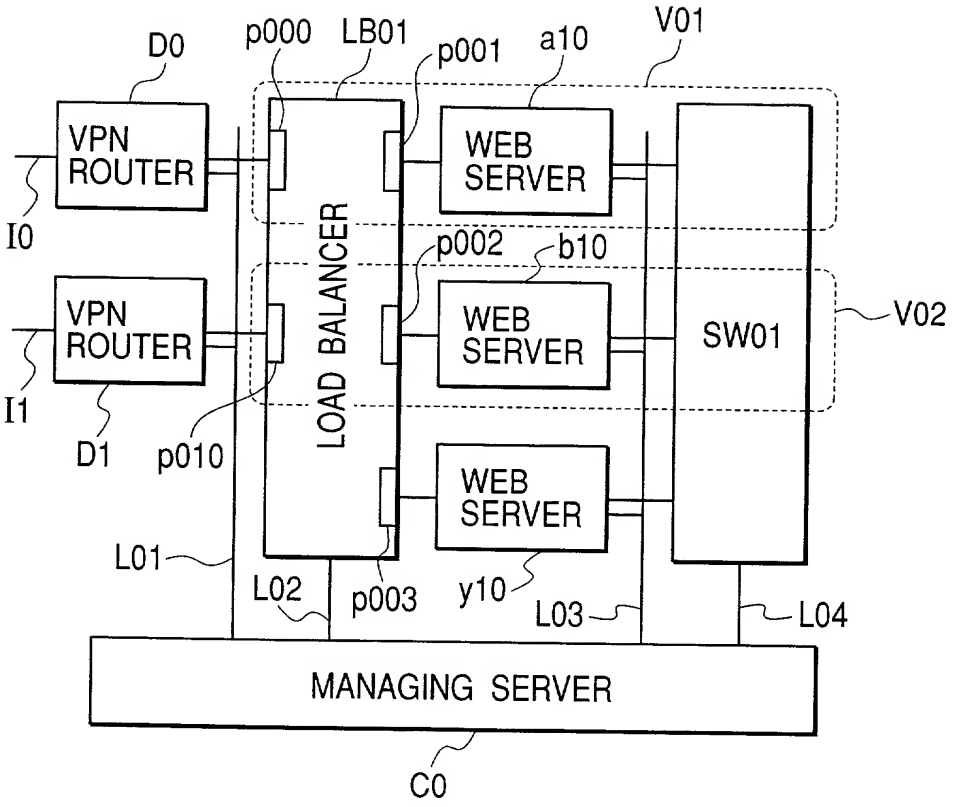

D0
p000
LB01
p001
a10
V01
VPN ROUTER
I0
WEB SERVER
LOAD BALANCER
p002
b10
VPN ROUTER
I1
WEB SERVER
SW01
V02
D1
p010
WEB SERVER
L01
L02
p003
y10
L03
L04
MANAGING SERVER
C0

FIG. 31

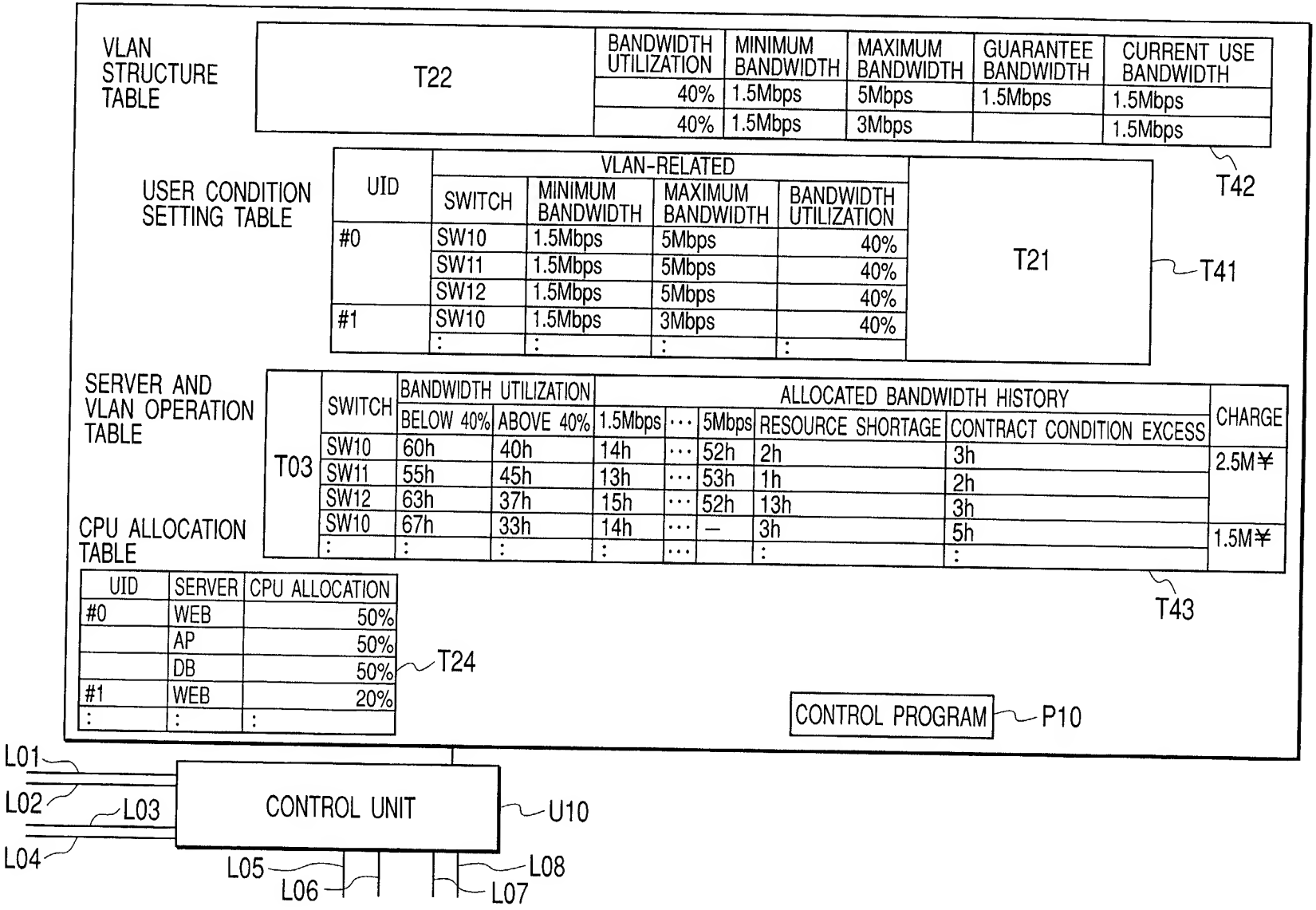
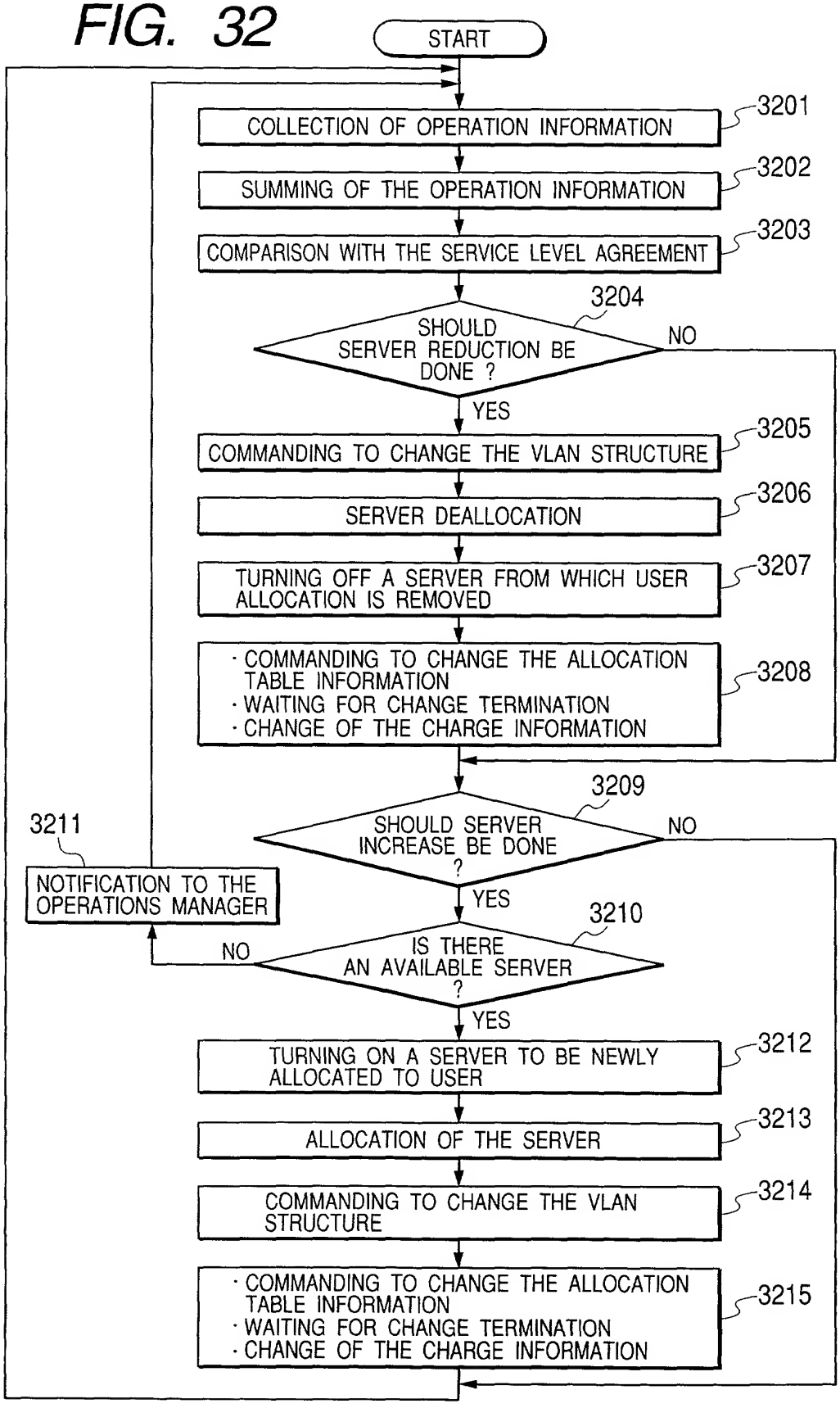

VLAN STRUCTURE TABLE
T22
BANDWIDTH UTILIZATION
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
GUARANTEE BANDWIDTH
CURRENT USE BANDWIDTH
40% 1.5Mbps 5Mbps 1.5Mbps 1.5Mbps
40% 1.5Mbps 3Mbps 1.5Mbps
T42
USER CONDITION SETTING TABLE
UID
VLAN-RELATED
SWITCH
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
BANDWIDTH UTILIZATION
#0 SW10 1.5Mbps 5Mbps 40%
SW11 1.5Mbps 5Mbps 40%
SW12 1.5Mbps 5Mbps 40%
#1 SW10 1.5Mbps 3Mbps 40%
T21
T41
SERVER AND VLAN OPERATION TABLE
T03
SWITCH
BANDWIDTH UTILIZATION
BELOW 40%
ABOVE 40%
ALLOCATED BANDWIDTH HISTORY
1.5Mbps
5Mbps
RESOURCE SHORTAGE
CONTRACT CONDITION EXCESS
CHARGE
SW10 60h 40h 14h 52h 2h 3h 2.5M¥
SW11 55h 45h 13h 53h 1h 2h
SW12 63h 37h 15h 52h 13h 3h
SW10 67h 33h 14h — 3h 5h 1.5M¥
T43
CPU ALLOCATION TABLE
UID
SERVER
CPU ALLOCATION
#0 WEB 50%
AP 50%
DB 50%
#1 WEB 20%
T24
CONTROL PROGRAM
P10
L01
L02
L03
L04
CONTROL UNIT
U10
L05
L06
L07
L08

FIG. 32


START
COLLECTION OF OPERATION INFORMATION
3201
SUMMING OF THE OPERATION INFORMATION
3202
COMPARISON WITH THE SERVICE LEVEL AGREEMENT
3203
SHOULD SERVER REDUCTION BE DONE ?
3204
NO
YES
COMMANDING TO CHANGE THE VLAN STRUCTURE
3205
SERVER DEALLOCATION
3206
TURNING OFF A SERVER FROM WHICH USER ALLOCATION IS REMOVED
3207
· COMMANDING TO CHANGE THE ALLOCATION TABLE INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
3208
SHOULD SERVER INCREASE BE DONE ?
3209
NO
YES
IS THERE AN AVAILABLE SERVER ?
3210
NO
YES
3211
NOTIFICATION TO THE OPERATIONS MANAGER
TURNING ON A SERVER TO BE NEWLY ALLOCATED TO USER
3212
ALLOCATION OF THE SERVER
3213
COMMANDING TO CHANGE THE VLAN STRUCTURE
3214
· COMMANDING TO CHANGE THE ALLOCATION TABLE INFORMATION
· WAITING FOR CHANGE TERMINATION
· CHANGE OF THE CHARGE INFORMATION
3215